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Improvement in Portable Forges.

Portable forges, from their neatness of construction and handiness in operation, have in a great many cases belied their name, and become welcome fixtures in shops and manufactories. In our experience as a manufacturer of machinery and tools, we always gave them the preference, especially for light work, and used them rather than the unsightly masses of brick, cinders, and ashes, generally dignified with the name of forge, structures which are a perpetual eyesore to the tidy workmen. But we have never yet seen an apparatus that seemed to fulfill the requirements of a portable forge so fully as that which is herewith illustrated. The whole apparatus, with its adjuncts, is contained in a chest thirty-one by twenty inches, and weighing but one hundred and fifty-seven pounds. A very few minutes suffices to convert this chest into a perfect operative forge, and when it is necessary to remove it to another point, as in bridge building, repairing railroads, etc., the parts may be separated and packed for removal or transportation with equal celerity. The legs are removable, and with all the other pieces are held in appropriate places provided for each in the chest; the hearth, bonnet, wind pipe, and other appliances, being contained in the same receptacle. When in use, the cover of the chest forms a support for the forge back and bonnet, and a fulcrum for the bellows lever, while the bellows is allowed free play by the lowering of one end of the chest bottom.

For the army, especially when on a march, for emigrant trains crossing the plains, for railroads, for dentists, silversmiths, bridge builders, and others, and on steamboats and ocean steamers, this portable forge is specially adapted. It has received the approval of United States army officers, after thorough trial at the government shops in Washington.

It was patented Dec. 27, 1864, through the Scientific American Patent Agency. Further information may be obtained by addressing the patentees, Samuel Rohrer or Wm. Carson, Palmyra, Mo. [See advertisement on another page.]

ROHRER'S PATENT PORTABLE FORGE.

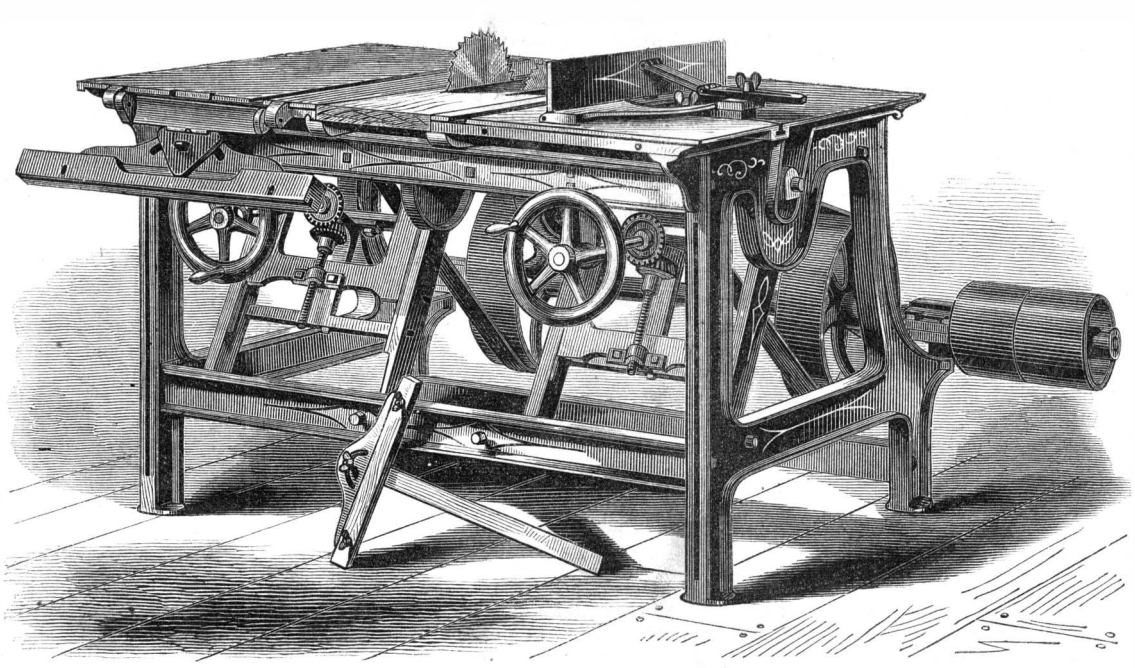
Sawing and Grooving Machines.

The usual method of adjusting the depth of cut of bench saws or grooving heads is to elevate one side of the table to the requisite incline, while the saw or cutter arbor remains fixed in one position. There are objections to this method of adjustment which must frequently have suggested themselves to practical workmen. The incline of the surface of the table interferes with the accuracy desirable in doing the work, as it demands more care in the guidance of the material to be worked; and the table thus alternately raised and lowered tends to become unsteady and liable to vibration, producing inferior and faulty work.

The machine shown in the engraving operates in an entirely different manner. Instead of the table being adjusted to the saws or cutters, they are raised or lowered to meet the demands of the work. The saws or cutter heads are secured to arbors, which run in boxes attached to a sliding frame under the table, mounted on another frame set on an angle with the upright and horizontal portions of the machine. The arbor frame with its saw or cutter head is elevated or depressed by a screw worked by bevel gears and a hand wheel, the latter projecting from the front of the machine. The incline is at such an angle with the center of the driving shaft at the rear of the machine, that in any position of the arbors the belts will always be kept tight. The splitting rest or guide is jointed so as to be inclined at any angle to saw at any bevel desired, and can be readily removed to permit the cutting of long stuff. The squaring guide is hinged to the table and can be turned up on the table for use, or allowed to drop, as seen in the engraving, so as to be out of the way when not required. It is so constructed as to swivel for cutting miters either way. A light guide, also made to swivel, seen resting against the front of the machine, can be used for light work, its stem traversing a transverse groove in the table.

These machines may be made double, as in the illustration, or single, as required, and may be used for splitting, squaring, mitering, or grooving. Being of iron, they are solid, enduring, and exact, complete without countershafts, and requiring no braces to keep them in place. By practical wood workers they are highly commended.

The patent was issued to Jonathan P. Grosvenor, of Lowell, Mass., and bears the date of May 5, 1868. Address, for further information, the patentee as above.



GROSVENOR'S PATENT SAW BENCH.

JUNE-BUGS are so plentiful in France that they are captured in large numbers and from their bodies is expressed an oil said to possess great value as a lubricant.

A Useful Official.

In the new building of the Department of Agriculture, at Washington, the happiest being will be our enthusiast, Townsend Glover, the naturalist, to whom our farmers apply for a knowledge of what birds eat the pippin apples, and what worm gets into the beet root. Glover is a Brazilian by the accident of birth, a Yorkshire Englishman by parentage, a German by education, American by adoption and enthusiasm. He is a singular looking man, short, thick, near-sighted, peculiar, an Admirable Critchton in the practical arts. Agriculture has been his fanaticism for forty years. He paints, models in plaster, engraves, composes, analyzes, and invents with equal facility. His passion is to be the founder of an index museum to all the products of the American continent from cotton to coal oil, from pitch pine to wine. Heretofore he has had only two little rooms in the dingy basement of the Patent Office; hereafter he is to have a handsome museum room in the new building, 103 by 52 feet and 27 feet high. His objects, already largely perfected, are to methodize, by models and specimens, the natural history, diseases, and parasites, remedies of every individual product in America. For example: A man wants to move to Nevada. What are the products of Nevada? Glover has a series of cases devoted to that State, models of all its fruits, berries, prepared specimens of its birds, illustrations of its cereals, flora, grasses, trees. A small pamphlet conveys the same information; the man knows what to expect of Nevada. A man forwards a blue bird; is it tolerable or destructive, to be encouraged or banned? Glover forwards the names of fruits, etc., which the blue bird eats. He will show you, in living, working condition, the whole lifetime of a cocoon; the processes of Sea Island cotton, from the pod to the manufacture; the economical history of the common goat; the processes of hemp, from the field to the hangman. Every mail brings to him a hawk, a strange species of fish, a blasted potato, a peculiar grass which poisons the cow. He is the most dogged naturalist in the world, probably; a wrestler with the continent. He is a bachelor, married to his pursuit —one of those odd beings hidden away in the recesses of government, whose work is in itself its own fame and fortune.

Speed of the Senses.

There are thirty one pairs of compound nerves in the human body, the sensory and motor fibers of which are so commingled as to render it an impossible undertaking to separate them by any means at present known. Now if, for instance, a needle be stuck into one of the fingers, the sensory fibers take the impression through the nerve and the posterior root to the spinal cord and thence to the brain. The command goes out to "draw the finger away." The mandate travels down the spinal cord to the anterior root, and thence through the motor fibers of the nerve to the muscles, which immediately act, and the finger is at once removed. All this takes place with great rapidity, but yet with nothing like the celerity once imagined.

The researches of Helmholtz, a distinguished German physiologist, have shown with great exactitude the rate of speed with which the nerve fluid travels; and other observers have given a great deal of time and patience to this and kindred questions. As the result of many deliberations, it was ascertained that the nervous fluid moves at the rate of about 97·1 feet in a second. Now electricity travels with a speed exceeding 1,200,000 feet in a second, and light over 900,000,000. A shooting star moves with a velocity of 200,000 feet in a second, and the earth, in its orbit around the sun, 100,000. A cannon ball has a mean velocity of 1,800

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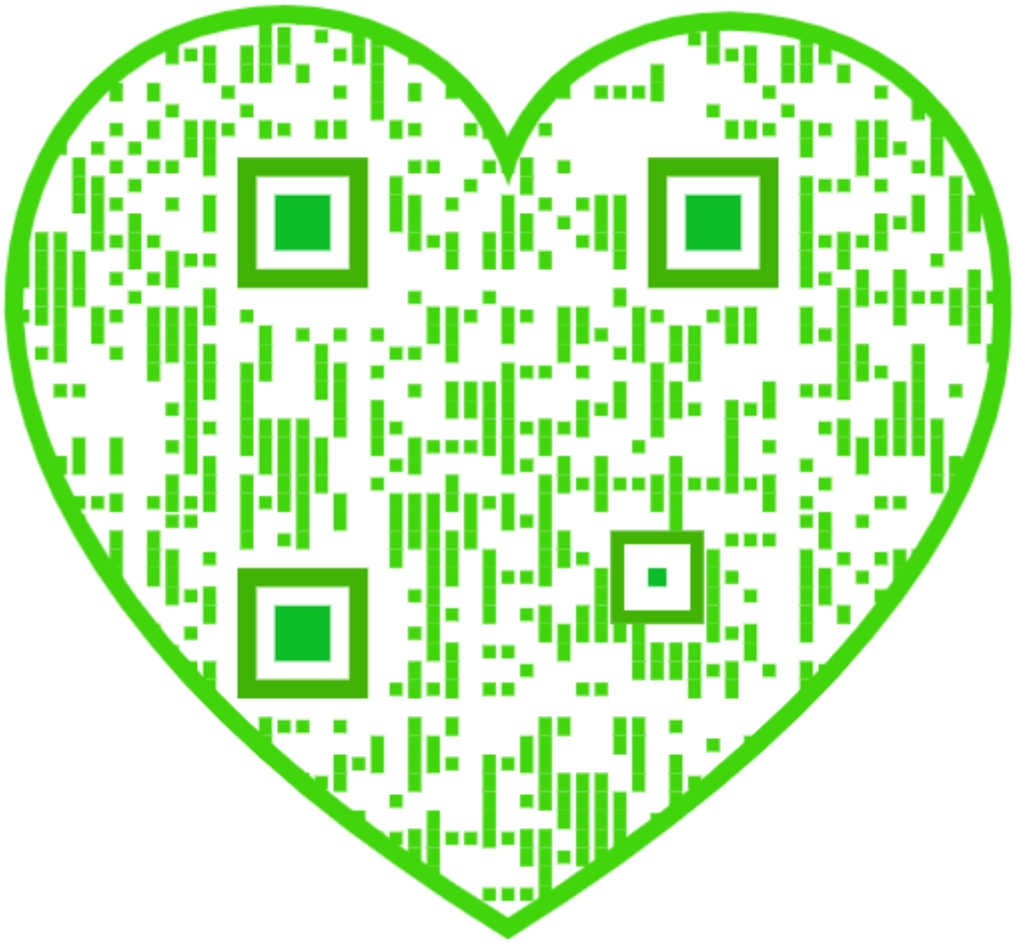

feet in a second; an eagle, 130; and a locomotive, 95. We thus perceive the nervous fluid has no very remarkable rate of speed—a fact which, among many others, serves to indicate its non-identity with electricity.

Prof. Donders, of Utrecht, Holland, has recently been making some interesting experiments in regard to the rapidity of thought, which are likewise interesting. By means of two instruments, which he calls the noematachograph and the noematachometer, he promises some important details. For the present he announces that a simple idea requires the brain to act for sixty-seven one thousandths of a second for its elaboration. Doubtless the time required is not the same for all brains, and that, by means of these instruments, we may obtain definite indications relative to the mental caliber of our friends. What invaluable instruments they would be for nominating caucuses for vestries, for trustees of colleges, for merchants in want of bookkeepers; in short, for all having appointments of any kind to make.

For the eye to receive an impression requires seventy-seven one thousandths of a second, and for the ear to appreciate a sound, one hundred and forty-nine one thousandths of a second are necessary. The eye, therefore, acts with nearly twice the rapidity of the ear.—*Galaxy.*

PUBLIC RIGHTS AS AFFECTED BY OPERATIONS OF RAILROAD MONOPOLISTS.

It is well that recent attempts of certain stock-jobbing cliques, headed by men notorious on account of vast wealth, and acknowledged superior skill in controlling the stock market to enrich themselves, have begun to enlighten the people in regard to the extent to which such abuses may be carried, and to demonstrate the wisdom of limiting the powers hitherto granted by legislative action to railroad corporations. They have obtained their power by the abuse of franchises originally obtained from the representatives of the people, through companies in which, by a series of adroit manipulations, they have succeeded in obtaining a controlling interest.

The general indignation which pervaded the public mind, when certain arbitary restrictions in regard to the shipping of freights over the New York Central railroad were inaugurated, seems to indicate that further imposition might exceed the limit of that forbearance which appears to have been so confidently relied upon in the management of railroad and and express monopolies in this country. We are greatly deceived, however, in our estimate of the character of the men who originated and developed the gigantic schemes which have recently created such wide spread apprehension, if the apparent present suspension of attempts to carry out the original plan in all its essential features shall prove to have been finally abandoned. We believe, therefore, that measures should at once be adopted that would immediately and permanently stop all attempted encroachments upon the rights of the public, by the acts of these financial autocrats.

The following exhibit of the manner in which the capital stock of the Hudson River railroad was increased from its original amount, and also of the way in which it was proposed to increase the capital stock of the Harlem and New York Central railroads, is taken from the *Atlantic Monthly*:—

Present capital,—Hudson.....	$14,000,000
Bonds outstanding Jan. 1, 1868.....	5,000 000
Present capital,—Harlem.....	6,800,000
Bonds outstanding Jan. 1, 1868.....	5,000,000
Present capital,—New York Central...	28,990,000
Bonds outstanding Jan. 1, 1868.....	11,347,000
Giving in sum total.....	$71,137,000

The fourteen millions credited to Hudson in the above summary represents only ten and a half millions of actual money, and owes its creation to one of those peculiar financial expedients by which shrewd American capitalists acquire the enviable title of railroad kings. When the head of the dynasty which now dominates over the three affianced companies made his first move by securing possession of the river route, he inaugurated a system of economical management, special traffic arrangements, and vast construction outlays which afforded a specious pretext for augmenting the capital stock. It was therefore voted that the then capital of seven millions should be increased to fourteen by an issue of bonus shares at fifty per cent. Each stockholder paid in fifty dollars, and received scrip, the par value of which was one hundred, but which sold in Wall street at forty-five premium. This splendid maneuver, by which the company obtained three and a half millions for the construction and repair fund, while the stockholders doubled their money, presented features too large and captivating to lapse into desuetude. It was now proposed to repeat the same operation along all the lines, which at the same time were to be consolidated. The scrip dividend in this second scheme was to be 33⅓ per cent.

This would give:—

Fresh capital,—Hudson.....	$6,000,000
" " Harlem.....	3 200,000
" " N. Y. Central.....	9,663,000
With previous sum total of capital.....	71,137,000
Capital of consolidation.....	$90,000,000

In order that dividends might be realized upon this large increase of stock, the restrictions upon the shipping of freights above alluded to were initiated, and an increase of rates for passenger travel and upon goods in bulk was determined upon. To compel the public to submit to such exactions, it was necessary to destroy competition, and to this end the securing control of the Erie Railroad was deemed necessary. The battle for supremacy was hotly waged between the two greatest stock operators this country has ever known, Messrs. Drew and Vanderbilt. Small operators who had not the good sense to shun danger were mercilessly crushed, and the financial interests of the country were greatly disturbed by the conflict. After days of suspense it at last became apparent that Mr. Drew was more that a match for Mr. Vanderbilt and the latter executed a masterly retreat, which left him apparently little worse for the conflict, and, we are confident, disposed to renew it whenever the opportunity seems favorable.

The developments of this celebrated struggle were such as to give birth to great apprehensions for the future welfare of the commercial interests which so largely depend upon the proper and just management of all the avenues of trade which radiate from the city of New York and connect it with the other commercial centers of the Union. It was seen that legislatures and courts were made the instruments of these powerful organizations, and that corruption had been carried to an unparalleled extent by unscrupulous agents of the opposing powers. Not these only were found to be adopting such means to attain their ends, but an examination of the contingent expenses of different railroad companies revealed the fact that astounding sums were paid for the manipulation of legislative bodies. "The Union Pacific paid not less than $500,000 for services rendered to the company by lobbyists at Washington. It recently cost the Missouri Pacific Railroad $192,178 to secure the possession of that road by State legislation. The New York Central credits $250,000 to the contingent fund for expenses at Albany in 1866–67. In view of these facts it seems just to modify the popular prejudice against the Camden and Amboy Railroad, which has certainly attained its ends in congress and at Trenton by a far more economical expenditure."

It is much easier to find fault with the existing state of things than to suggest the proper remedy. We believe that the present system of granting charters to corporations is mischievous in its effects so far as it relates to franchises which involve such large and general interests as public highways, canals, and railroads. At least the government should retain the power to assume the control of all such internal improvements by paying the companies their real value, at any time that their defective management seems to call for such a procceding. A railroad thus removed from the control of those who desire to make it the means of public extortion might be conditionally leased to another company, or operated by the government itself. We admit that certain objections might be raised against this system, but we think that when compared with the advantages which would be derived from it, they would be found neither so numerous nor so formidable as might at first be anticipated.

Some means must be devised by which officials can be cured of their speculative tendencies; we care not what, so long as they answer the purpose, and provide for the proper punishment of any railroad official who deals directly or indirectly in railroad scrip. The suffering of a road to become so shamefully out of repair as the Erie has notoriously been, should be sufficient cause for the removal of its officials and the appointment of suitable persons to fill their places by the government.

That the existing laws under which railroads are organized and operated need thorough revision, seems the inevitable conclusion of a candid and careful consideration of the subject. That delay is fraught with danger also seems certain. We trust that the public will be aroused to timely action upon this matter, and that the possibility for any one man to obtain hereafter the control of any internal improvement, which affects directly every individual in the commonwealth, shall be forever terminated.

Science Familiarly Illustrated.

Gunpowder---Its Manufacture and Uses.

Gunpowder is a solid, explosive, mixture, composed of niter, sulphur, and charcoal, reduced to powder, and mixed intimately with each other. The proportion of the ingredients varies very considerably; but good gunpowder may be composed of the following proportions:—seventy-six parts of niter, fifteen of charcoal, and nine of sulphur, equal to one hundred. These ingredients are first reduced to a fine powder, separately, then mixed, intimately, and formed into a thick paste. This is done by pounding them for a long time in wooden mortars, at the same time moistening them with water, to prevent the danger of explosion. The more intimate is the mixture the better is the powder; for, since niter does not detonate except when in contact with inflammable matter, the whole detonation will be more speedy the more numerous the surfaces in contact. After the paste has dried a little, it is placed upon a kind of sieve, full of small holes, through which it is forced. By that process it is divided into grains, the size of which depends upon the size of the holes through which they have passed.

The powder, when dry, is put into barrels which are made to turn round on their axis. By this motion, the grains of gunpowder rub against each other, their asperities are worn off, and their surfaces are made smooth. The powder is then said to be glazed. The granulation and glazing of the powder causes it to explode more quickly, perhaps, by facilitating the passage of the flame among the particles.

When gunpowder comes in contact with any ignited substance, it explodes, as is well known, with great violence. This effect may take place, even in a vacuum. A vast quantity of gas, or elastic fluid, is emitted, the sudden production of which, at a high temperature, is the cause of the violent effects which this substance produces. The combustion is, evidently, owing to the decomposition of the niter by the charcoal and sulphur. The products are, carbonic oxide, carbonic acid, nitrogen, sulphurous acid, and, probably, sulphureted hydrogen. Mr. Cruikshanks has ascertained that no perceptible quantity of water is formed. What remains, after the combustion, is potash, combined with a small portion of carbonic acid, sulphate of potash, a very small proportion of sulphuret of potash, and unconsumed charcoal. But that water is produced by the explosion of gunpowder is proved by its presence in the piece after it has been fired. A sufficient quantity is developed to moisten and foul the bore of the piece, and necessitate its cleansing, and to hold *in transitu* the unconsumed portions of the charcoal, or other ingredients. Every practical gunner or expert with the rifle or pistol knows that every discharge of common gunpowder develops more or less of water; else why the cleansing of cannon or gun barrels, after successive discharges, when they become fouled by the remains of the discharges? Explosion releases the water held in combination with the components of gunpowder, as well as the lighter gases. The explosion of gunpowder is as surely a means of liberating the combination of hydrogen and oxygen as of liberating the nitrogen and carbonic acid.

We need a gunpowder, or something to take its place, which will not develop miosture to foul the bore of the gun. Such a discovery we believe to be within the limit of inventive talent.

The elastic fluid which is generated when gunpowder is fired, being very dense, and much heated, begins to expand, with a force at least one thousand times greater than that of air under the ordinary pressure of the atmosphere. And, allowing the pressure of the atmosphere to be fourteen and three fourths pounds upon every square inch, the initial force or pressure of fired gunpowder will be equal to at least fourteen thousand seven hundred and fifty pounds upon every square inch of the surface which confines it. But this estimate, which is that of Mr. Robins, is one of the smallest which has been made. According to Bernoulli, the initial elasticity with which a cannon ball is impelled is, at least, equal to ten thousand times the pressure of the atmosphere; and, from Count Rumford's experiments, it appears more than three times greater than this.

Gunpowder, on account of its expensiveness, and the suddenness and violence of its action, is not employed as a regular moving force for machinery. It is chiefly applied to the throwing of shot, and other projectiles, and the blasting of rocks.

When a ball is thrown from a gun, the greatest force is applied to it, by each particle, at the moment of its explosion. But, since the ball cannot at once acquire the same velocity, with which the elastic fluid, if at liberty, would expand, it continues to be acted upon by the fluid, and its motion is accelerated, in common cases, until it has escaped from the mouth of the piece. The accelerating force, however, is not uniform; and hence, the following circumstances deserve attention:—1. The elasticity is, inversely, as the space which the fluid occupies; and therefore, as it forces the ball out of the gun, it continually diminishes. 2. The elasticity would diminish, in this ratio, even if the temperature remained the same; but it must diminish in a much greater ratio, because a reduction of temperature takes place, both from the dispersion of the heat, and the absorption of it, by the fluid itself, during its rarefaction. 3. The fluid propels the ball, by following it, and acts with a force that is, other things being equal, proportionate to the excess of its velocity, above the velocity of the ball. The greater the velocity the ball has acquired, the less, therefore, is its momentary acceleration. 4. From this change of relative velocity, there must be a period when the velocity of the ball will exceed that of the elastic fluid; and, therefore, the proper length for a gun must be that in which the ball would leave the mouth at the time when the velocities are equal; and all additional length of the piece, beyond this, can only serve to retard the ball, both by friction and atmospheric pressure.

The force of fired gunpowder is found to be very nearly proportionate to the quantity employed; so that, if we neglect to consider the resistance of the atmosphere, then the hight to which the ball will rise, and its greatest horizontal range must be, directly, as the quantity of powder; and, inversely, as the weight of the ball. Count Rumford, however, found that the same quantity of powder exerted somewhat more force upon a large ball than on a smaller one.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Explosive Gases in Steam Boilers.

MESSRS. EDITORS:—Almost every one practically conversant or theoretically acquainted with steam boilers, has his theory of the cause of explosions, which he adapts to any and all cases; and this may account for the singularly contradictory evidence given before coroners and judges in cases where the explosion of a boiler is one of the items in the cause. The testimony of practical engineers, however, who have no personal interests at stake, and who have given their personal attention to an examination of exploded boilers, generally agrees as to the proximate cause of explosion. This seems to tend to prove the fact that boiler explosions, under ordinary circumstances, may be accounted for, and the subject is one of very great importance. But occasionally there may be cases which puzzle the heads of the most capable engineers.

One of the theories of boiler explosions is, that when the water gets low, leaving fire or heating surface exposed, or covered only with steam—a poor conductor of heat—the iron becomes heated, and will produce a decomposition of the steam, liberating its gases and absorbing the oxygen of the iron. This produces the combination known as oxy-hydrogen gas, highly explosive. It is rarely that enough of oxygen is eliminated, however, to make the mixture dangerous;

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but an admission of oxygen from the atmosphere by the leakage through the feed or water pipe. may suffice to make the mixture of gases really dangerous.

A case within the writer's knowledge seems to give color to this hypothesis. On a Saturday afternoon the supply pipe of a boiler refused to deliver water, and the engineer prudently drew his fire and stopped his engine. The pump was overhauled and repaired, but, being late, the boiler was not fired up again. On Sunday, twenty-four hours after, the engineer opened the man-hole at the end of the boiler, to see if any damage had been done by overheating. The interior being dark, he introduced a lighted lamp, when an explosion occurred, sending the engineer through a wooden partition ten feet away, burning his skin and scorching his hair.

What did it? Not steam. Was it gas, and if so, how was it generated, and how did it accumulate in a cool boiler? An answer from thorough-going engineers is solicited. We need facts, not speculations; the results of practice, not the vagaries of theory. PRACTICAL ENGINEER.

Mechanical Distribution of Electricity.

MESSRS. EDITORS:—Your correspondent, Mr. G. Wright, when asserting, page 21, that the established theory is wrong, —which teaches that only the outside of conducting bodies can be charged with electricity,—overlooks the fact that when he brings into the inside of a charged body one end of a conductor, of which the other end projects outside this body, the electric charge must flow towards the outward projecting end, which is now further from the center than the outside of the body itself. This is exactly conformable to the established theory, which teaches that the electric charge is always distributed in such a way that the greatest amount is further from the center of the body, or from the common center of any number of bodies which are in electric communication. Hence an equal distribution takes place only on a globe; in an elongated body it is accumulated at the ends, and more so in proportion that these ends are further apart. Experiments teach that when a body charged with electricity is touched in its interior by a conductor, so small that no conducting portion extends outside, but is attached to a non-conducting handle, then this conductor will receive no charge whatever, in fact this is one of the common lecture room experiments which I have performed hundreds of times, before my classes in physics. On this experiment, and on many other well established facts, the common theory is founded. But when Mr. W. attaches his test ball (in place of an isolating handle) to a small wire, as he states, he of course can not only draw sparks from the inside of any body charged with electricity, but even discharge it entirely, if he keeps the wire in his hand. These facts are familiar to every person more or less acquainted with electrical experiments.

It has never been claimed by electricians, that a body could not be wholly or partially discharged from its inside by a good conductor, which is in electric communication with other conductors outside; and this is all that Mr. W. has done. When he tries the experiment in the right way, and attaches his ball to a glass rod or silk cord, in place of a wire, and then tries to charge his ball by touching alternately the inside and the outside of a hollow body charged with electricity, and then tests the charge of his ball by means of a gold leaf electrometer, he will see the difference, and it will give him a better understanding of the established theory.

The fault is, that our common text books on natural philosophy are not explicit enough on many points, and this gives rise to misunderstandings of different kinds, the best remedy for which is the study of more extensive works, in which we find the results of experiments and researches which it would take us a life-time to find out ourselves.

P. H. VAN DER WEYDE, M. D.

New York city.

Loss of Gas---Wet Meters.

MESSRS. EDITORS:—A correspondent, whose letter is published on page 10, Vol. XIX., of the SCIENTIFIC AMERICAN, says in regard to errors which may occur in wet gas meters:

"When the consumption is large, and the working of the axle easy, a momentum will be acquired by the drum, so that the buckets will be only partially filled as they pass over to the supply pipe. The register records the same as with full buckets."

I think this could never occur in a well constructed meter, as the "*vis inertia*" of the fluid in which the drum revolves, would always compensate for the momentum which would be acquired by rapid motion. Besides, meters, if properly constructed, will not permit such a rapid flow of gas as would make any assignable error in the rotation of the drum.

S. L.

Brooklyn, N. Y.

Inventions Needed.

MESSRS. EDITORS:—I read your notices of "Inventions Needed," in a late number of the SCIENTIFIC AMERICAN, and was pleased to see you stimulating the inventiveness of the country. In imitation of your example, I wish, with your permission, to suggest one or two machines and inventions which might be of service to the inventor. I expect, at no remote day, to put up an indefinite number of bushels of desiccated potatoes. To prepare them for the dry house they should be washed carefully, so as not to bruise them, and not a few at a time, but by the wagon load, or by machinery. In the next place, they must be cut up into pieces not over three eighths of an inch thick, and all of a uniform thickness, so that the drying process will be uniform. If a machine automatically fed and worked with great speed, and not too costly, can be produced, it will pay. Among the parties producing vegetable cutters, no one has yet struck at an apparatus of this sort. If any one is produced we would like to try its working powers. Address C. KIMBALL.

Baltimore, Md.

For the Scientific American.

USE OF RAW AND COOKED FOOD.

The design in cooking food is not only to make it more digestible (many varieties being as easily digestible raw as when cooked), but the principal use of cooking is the destruction of microscopic seeds and eggs, often existing in raw food, which would produce vegetable and animal parasites in the system. The last are called entozoa, and the study of them, with the injury they produce in man, now constitutes a peculiar branch of medicine.

The most interesting of these are two species of the tapeworm, one of them originating from raw pork. Swine are subject to a disease called measles, and such diseased pork is full of the germs of future tapeworms in men. When human beings are thus affected they discharge daily thousands of microscopic eggs. When one of these—which may become dry as dust without losing its vitality—enters the stomach of a pig with its food, it produces again the measles in this animal. This explains why Jews are rarely affected with tapeworms—cooks and butchers often. Even raw beef has produced tapeworms by being cut with a knife also used for pork. Cooking, thorough salting, and smoking destroys the germs, but cleanliness, of course, is essential. It is only at present that the sanitary measures prescribed by Moses for the Israelites have been fully appreciated.

Dr. Fleming, last year, read a paper before the British Association on the prevalence of tapeworm in Birmingham, Eng. He supposed it was caused by the water containing sewage contamination. If this is so, it would appear that tapeworms may be propagated by impure water as well as by unclean pork. It is a hint to us to take precautionary measures to have our drinking water as clean as possible. Without containing germs of tapeworms, it may contain many other impurities and parasitical eggs. Cooking, of course, destroys all these, and this is one of the reasons why the general moderate use of coffee and tea has been universally productive of increased health. Simple water becomes flat and unpalatable by cooking, as the heat drives out all the air which it contains in solution; therefore a perfect filter, or melted clear ice, is the best thing for obtaining good drinking water when it cannot be obtained from a deep pure well or spring, purified by natural filtration.

The trichinæ are another class of parasites, affecting the human system even more frightfully than the tapeworm. They are also produced by the use of raw meat, but there has lately been published so much on this subject that the mere mentioning of it will be sufficient.

The distoma, or fluke, called by the French douve, is a large class of parasitical worms, of which more than two hundred species have been studied. One of them is very common in the liver of the sheep and horse, and infests also the human liver. The polystoma, an allied genus, has also several species, two of which are sometimes found in the human body, one inhabiting the veins.

We will only mention the ligula, which infests the abdominal cavities of birds and fishes, and proves fatal to them; the hydatids, which are often found in enormous abundance in the abdomen of quadrupeds, especially of the ruminant order; the cænurus, common in the brain of sheep, destroying the animal by pressure on that organ; the different entozoa, by which cats and dogs suffer in different parts of their bodies; and, finally, the snake-like worm occasionally developed in the interior of the eyeball of the horse.

Now, as regards the origin of these animals, spontaneous production is out of the question. Every living being is produced from an egg; therefore, the only possible explanation is, that the microscopic small eggs are taken into the system with the food. When their vitality resists the digestive power, these eggs are absorbed, enter in the circulation with the blood, and are developed at that part of the body where the conditions are favorable for their growth. This idea is verified by the latest microscopic examinations about the origin of the infusoria, by which it is proved that the very dust of the air is full of myriads of eggs of all kinds, only waiting a favorable opportunity to be developed into the corresponding animal.

The most common of all human internal parasites are the ascarides, of which the largest species have nearly the shape of a common earth worm, attaining sometimes the length of two feet, and cause alarming symptoms. The small variety is very common in children, and is supposed by some to originate from the eggs of flies deposited on or in the food. Most animals of this class are at first worms, the eggs being laid in some dead animal, meat, cheese, or other article, which gives nourishment to the growing worm, which afterward passes through the regular transformation into a fly. When these eggs are hatched in the intestines, under very different circumstances, they are developed into an animal which differs greatly from that developed in the air.

In healthy, vigorous children the digestive powers will resist the hatching of these eggs, and even the worms themselves will be digested, when accidentally hatched or otherwise introduced in the system. Only those of weak digestive powers are subject to worms, and this observation has lately given rise to a different medical treatment successful in many cases of these infantile troubles, namely, in place of administering to the little sufferers vermifuge and purges (which only give temporary relief and do not remove the cause, when this cause is weakness, but even weaken the system still more), tonics and a strengthening diet are prescribed. In this way the primary cause (the weak digestion) is removed, as in healthy, strong intestines worms cannot exist, but are at once digested.

Occasionally persons are found who have the peculiar notion of frequently eating raw meat and who give it to their children, with the idea that it possesses more nourishing qualities. But, even if this idea be correct, it is more than fully counterbalanced by the perils we have indicated, and experience teaches us that those persons who have apparent good health are subjected to more diseases than others. Freshly cooked food, therefore, is preferable for the reasons above given. M D.

Glyphography.

Having recently made trial of the process of glyphography in connection with the reproduction of engraved plates from photographs, and having obtained a considerable measure of success, we shall describe the process, if not in complete detail, at least so minutely as to enable any of our readers to practice engraving by the process in question with a fair degree of success.

A polished plate of copper, such as is usually employed by engravers, is blackened by being washed over with sulphide of potassium, sulphide of ammonium, chloride of platinum, or other means. The plate is then washed and dried, and is evenly coated with a mixture of wax, resin, and sulphate of lead, the thickness of the coating not exceeding a thirtieth of an inch. This coating is white and smooth, and the plate when thus prepared is ready for being sketched upon, or, as was the case in our trials, for being photographed upon. The details of our method of effecting the photographic part of the operation shall form the subject of another communication.

On the figure thus photographed, or traced by pencil, the artist proceeds to make his drawing with little tools like needle points, fixed in wooden handles. These tools should vary in size, or rather in the thickness of point, according to the nature of the work intended to be accomplished. It will be found most advantageous to use tools one side of which has been filed flat, and a curve given to them near the point by bending them while heated in the flame of the gas. Every touch or stroke of the artist should penetrate through the waxy varnish to the surface of the plate, which, being black, reveals every touch—the work thus appearing black on a white ground, in the same manner as if it were effected by pen and ink on white paper.

The coarseness or heaviness of the lines depends upon the tool by which they are cut; hence broad lines require a tool flattened at the point like a chisel. The drawing must be made as in nature, or non-reversed.

When the picture is examined and found to be right, it is dusted over with plumbago, which, by means of a bushy camel's-hair pencil, is distributed through every line and over every part of the surface. Although we find that other conducting substances, such as bronze powders, act better than plumbago, we have very beautiful pictures produced by Mr. Palmer, in which the coating is the same as that here described.

The plate thus prepared is immersed in an electrotype cell, and a thin tissue of copper is deposited on it by the battery. When the plate has been immersed at night, we find in the morning that the deposit of copper is sufficiently thick to allow of its being removed. The battery we use is Smee's, and the depositing solution is the sulphate of copper, rendered decidedly acid with sulphuric acid.

The cast thus obtained must be backed up with soft metal, *sec. art.*, and in this state it will, if printed from as a wood engraving, yield an exact fac-simile of the original drawing.

If it be required to lower broad masses of white, this can be effected in one or other of the following ways:

After the drawing has been finished, and before it is brushed with black lead, paint over the broad masses of white with melted wax, and let the thickness of the mass thus painted on the surface be determined by the area of the white portion, care being taken not to approach too closely to the lines of the drawing. This having been done, proceed with the plumbago as already directed.

Another way by which to lower the broad whites is to take a cast in plaster of Paris from the original plate, and in this cast to lower any part required by means of a suitable gouge-shaped tool. From the plaster block thus trimmed may be obtained, by means of recasting in plaster and stereotyping, any number of metal blocks in a condition ready for printing.

We have in our possession some pictures which have been obtained from surface blocks prepared nearly as described, and which are so fine and delicate as to warrant any person unacquainted with the method of their production in believing that they were printed from engraved copper or steel plates.—*British Journal of Photography.*

Another Invention Wanted.

Some small, neat thing, to be worn with watch seals, or as a ring, or anywise one pleases, with which to cut open envelopes when one receives letters from the post office, is greatly required. What pulling, tearing, looking for knives, scissors, paper folders, or thrusting in of finger nails, or ripping open and rending by main strength, is daily practiced. Some neat, simple, convenient instrument can be supplied and presented that will sell to nearly every body, and I know the SCIENTIFIC AMERICAN will do the business well, if employed.

K.

ELECTRO-MAGNETIC machines are perhaps the least likely of all inventions to supersede the steam engine. The consumption of a grain of zinc, as Mr. Joule has shown, though much more costly than a grain of coal, does not produce more than one-eighth of the same mechanical effect

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PAPER--ITS MATERIAL AND USES.

From the best authorities it would appear that cotton was the first material used in the manufacture of paper, after papyrus. The exact date is not known, but it is pretty well authenticated that paper from this material was made and used in the eleventh century. The Chinese, since the decadence of the papyrus manufacture in Alexandria, Egypt, may be considered the greatest manufacturers and users of paper. With them this material occupies a place of importance not equaled by any other one substance in use by us. They employ it for clothing, building, decorations, toys, and a hundred other necessities. They utilize linen rags, the inner bark of trees, the fibers of cane and bamboo, and for "rice paper" the stems of a wild leguminous plant. The soles of boots, umbrellas, hats, garments resembling in texture and durability woven fabrics, kitchen and table utensils, boxes, bowls, etc., this ingenious people fashion from paper. Even their pocket handkerchiefs are made of it; and some specimens of their paper are scarcely inferior in toughness and elasticity to the best textile fabrics.

We have scarcely reached their aptness in the quality of the paper, and are far behind them in adapting the material to our every day needs. We make paper water-pipes, row boats, paper hats, and bonnets, paper collars, cuffs, and shirt-fronts. We use it for twine to tie up paper packages; a specimen for machine belting is now on our table. It is doubtful if any other material is susceptible of a greater diversity of uses; yet we seem to lack the means of producing it cheaply enough to supersede other and more costly substances. It is hardly to be believed that knowledge of the manufacture, the various processes to adopt it to manifold uses, is lacking, but rather the difficulty of procuring the material from which it is made prevents us from making a more extended use of it.

For some years past paper "stock" has been very dear. Rags advanced in price, as cotton went up. Wood fibers and straw have been tested with a view of keeping down the continually increasing price of rags and furnishing a cheaper and equally valuable material. Yet these, especially the latter, are not new attempts. So long ago as 1756 the Germans used straw, and in 1776 a book was printed in France the paper of which was made of linden or basswood. In 1800 good white paper was made in England from straw and wood. It is certain that neither straw nor wood have yet been found equal to cotton and linen as a material for the production of paper.

Under these circumstances we have been much interested in the examination of specimens of paper made from the okra plant, which can be grown easily in every state of the union, yielding, even with the most careless cultivation, from four to eight tons of dried stalks per acre. As it can be grown in the immediate vicinity of the mills, and will yield to the cultivator from forty to eighty dollars per acre, exclusive of the market value of the seeds, there would seem to be some reason for looking to this as a proper substitute for the expensive stock now employed in the manufacture of paper. Certainly the specimens of okra paper before us, ranging from coarse brown wrappers to the finest printing, note, and bank paper, seem to offer good evidence of the value of this vegetable production as paper stock.

The subject is worthy the attention of paper manufacturers and others, as in addition to the low cost of the material, the expense of its preparation for pulp is much less than that demanded by the use of rags.

SILK AND ITS CULTURE.

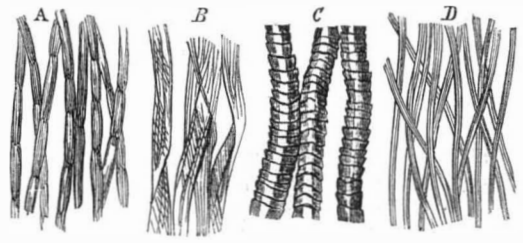
We have almost every variety of soil and climate, therefore there appears to be no good reason why the production of silk should not ultimately become one of the leading industries of our country. Already the subject is arresting some attention in California; but, like all other new branches of industry, it advances slowly. The workmen need experience, the capitalist needs confidence, and the markets need time. If there is haste there is danger, and there is not wisdom in attempting to do business without a thorough understanding of the conditions under which it can be made to pay. The *Alta California* expresses the belief that those who engage in it under favorable circumstances cannot fail of success. Among these circumstances are unincumbered ownership of the land, of soil favorable to the mulberry, a good knowledge of the method of taking care of the worms, eggs, and cocoons, and the facilities of getting labor cheap, such as that of women or children during the busy season.

The sale of cocoons raised last year in California numbered 200,000, of which half were killed under a misapprehension, so that 100,000 are supposed to remain for the production of butterflies this summer; and of these 50,000 are females, which should lay 300 sound eggs each. Let us suppose, however, that they lay 200 each, the number of cocoons this year would be 10,000,000; in 1869, 1,000,000,000; and in 1870, 100,000,000,000; that is if there were food and care for all. But neither can be obtained for such a multitude. It is doubtful whether more than 2,000,000 cocoons will be bred this year. There are great numbers of the mulberry trees in nursery, but very few in plantation, as they should stand, to produce leaves for the worms. Until there are extensive plantations of the mulberry, the production of silk must remain unimportant. In the mean time, however, the experience, the confidence, and the knowledge required for success are gradually establishing themselves, so that they will soon be urging the mulberry cultivation ahead instead of lagging behind.

Silk is the produce of a member of the animal kingdom, and occupies the highest position among all the tissues as regards resistance and durability, the average length of each single thread afforded by our worm being about three hundred yards. It has been ascertained that bundles of fibers of equal size, of silk and flax gave the following unequal powers of resistance:—

Silk supported without breaking a weight of.	34 lbs.
New Zealand flax	23¼ lbs.
Hemp	16⅓ lbs.
Ordinary flax	11¾ lbs.
Cotton, less than	7 lbs.

In order to better appreciate the character of these textile materials, single fibers of each have been selected and placed side by side; and to these have been added fibers of wool.

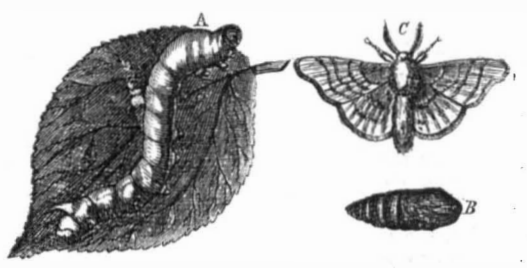


Fiber of flax, A; of cotton, B; of wool, C; of silk, D: placed so that their relative size and markings may be readily contrasted. The fiber or cells of cotton are manifestly much thinner and less resisting than those of the other substances.

The manufacture of silk appears to have been first known and practiced by the Chinese nearly three thousand years before the Christian era, but it was not until the sixth century that the western world received the great boon of a supply of silkworm eggs. The manufacture of silk began to be successful in France in 1521, during the reign of Francis I., and that country now furnishes the world with the finest quality of dress silk.

It will be interesting to consider some of the methods adopted for rearing the worm, and the processes through which the silk passes before it can be used for sewing or clothing purposes. The eggs of the worm are about the size of a pin's head, and are obtained from the moth of the previous year, being deposited on sheets of paper. The Chinese are careful to keep back the hatching of the worm until its food, the mulberry leaf, is sufficiently grown; and to effect which a variety of ingenious methods are employed.

The worm, when hatched, resembles a black thread, and is about a tenth of an inch long. If plentifully supplied with food, it soon increases in size, shedding its external skin as that becomes too narrow for the comfort of its owner—an operation repeated four times during its brief existence of little more than a month. The worm at last becomes sickly, ceases to feed, and begins to spin a delicate thread, which proceeds from two orifices in the head, the two threads being joined together by the mouth. The little creature encloses itself in the fine ball, called a "cocoon"; and having finished this little house, it becomes changed into the chrysalis state, in a similar manner to that noticed in the common caterpillar of our own country.



In the annexed engraving the silk worm is represented. A, the worm feeding, and near its spinning time. B, the chrysalis, as taken from the cocoon. C, the moth, as produced from the chrysalis.

The domestic treatment of the silkworm has been brought to great perfection in Italy. Formerly the eggs were hatched at uncertain periods, depending on the natural warmth of the season, or they were put in manure beds, or were worn in little bags about the person next the skin. They are now hatched in an apartment heated to the proper degree by a stove, but they are first washed in water, and afterward in wine, to separate light eggs, as well as dirt, and the gummy envelope which surrounds the heavy ones.

The temperature of the hatching room is at first 64°, but is gradually raised one or two degrees daily, until, it reaches 82°, which it is not to exceed. Pieces of coarse muslin, or of white paper pierced with holes, are placed over the eggs when they are about to be hatched. Through these the worms creep to the upper surface, and are removed as soon as possible to a cooler place. Young leaves and sprigs of mulberry are laid upon the muslin or paper, when the worms eagerly settle on the leaves, and can thus be transferred to trays, and removed to the nursery. This is a dry room of regulated warmth, with windows on both sides, so that free ventilation may be attainable. Chloride of lime should be in use to purify the air, and a thermometer and hygrometer to regulate the heat and moisture; the latter is apt to abound where silkworms are kept, and is very prejudicial to them, moist exhalations arise from the leaves and from their bodies; fermentation also soon takes place if litter and dung be not speedily removed from their trays; these are fertile sources of disease among the worms, and may carry off thousands in a day.

The silkwork is liable to many diseases which can only be guarded against by careful experience and watching. The improved means, first employed in Italy, for preserving the health of these valuable insects, are due to Count Dandolo, who gave particular and scientific attention to the subject, and superseded many an absurd custom in the rearing of silkworms. According to his method wicker shelves are arranged in a room at convenient distances, and are lined with paper, on which the worms are placed. Such worms only are placed together as have been hatched at the same time, the space allowed them being, for each ounce of eggs, 8 square feet during the first age, 15 feet for the second age, 35 feet for the third age, 82½ feet for the fourth, and about 200 feet for the fifth age. The mulberry leaves are chopped in order to present a large number of fresh-cut edges to the young insect. Four meals a day, as a regular rule, and luncheons between when the worms are particularly voracious, are the liberal allowance for their subsistence. The temperature at which silkworms are healthiest appears to be from 68° to 75°, though they are able to bear a much higher temperature. Alternations of heat and cold are exceedingly injurious to them.

When the silkworms are about to spin they are provided with little bushes of broom, heath, or other flexible substance, arranged upright between the shelves, their tops being bent into an arched form by the shelf above. The bushes are spread out like fans, to allow plenty of space for the cocoons; for if crowded, the worms are apt to form double cocoons, two working together, and these are worth only half the price of single cocoons.

When the time arrives for reeling off the silk, the cocoons are thrown into a vessel containing hot water, the latter serving to dissolve the gummy matter surrounding the true thread. By means of a small wisp the end of this thread is found, and a number of these are wound on to a reel; the fineness of each of the filaments being too great to permit of its being used in the single state. In thus winding the silk, the threads are gradually spread apart, so that they may not adhere together while moist, which they would otherwise be liable to do, owing to the gum remaining on the surface. The color of the silk varies from a beautiful and brilliant yellow to a light grey, or "French white"; and in this state it is exported for the use of the silk throwsters, whose business it is to convert the reeled silk into a thread capable of bearing the wear of subsequent manufacturing operations.

HOW TO ASCERTAIN THE AMOUNT OF IMPURITIES IN WATER.

On page 366 we explained in a short article how to test the purity of water, and mentioned seven different tests relating to the most commonly occurring impurities. We will now show how in the most simple manner the amount of each of these foreign ingredients, dissolved or suspended in water may be ascertained.

QUANTITY OF SOLID MATTER.

The total amount of all kinds of solid matter can only be ascertained by the help of a balance. A certain quantity of water, say a gallon or a pint, is slowly evaporated by a gentle heat—boiling may cause loss of the solid matter also—and after being concentrated to one or two ounces, it is placed in a small porcelain or platinum dish or cup, in which it is finally evaporated to dryness. The weight of the solid matter remaining will tell how many grains there were present to the gallon or pint. To obtain the most correct result, it is best to subtract the weight of the dish when clean, from its weight when coated with the deposit obtained after evaporation.

Fortunately for most of the other tests the use of the balance may be dispensed with in case of necessity, as the amount of impurity may be very correctly arrived at by the amount of the test found necessary to cause a complete precipitation.

QUANTITY OF COMMON SALT, CHLORINE, AND HYDROCHLORIC ACID.

By the assay of silver a solution of the nitrate is made and then a solution of common salt of certain strength is employed to precipitate all the silver, and the amount of silver is arrived at by the amount of the standard salt solution employed for this purpose. This method may be inverted, and for ascertaining the amount of common salt or other chlorides in impure water, we may employ a standard solution of nitrate of silver of certain strength, and watch how much of it is required to precipitate all these chlorides. It is of the utmost importance to use chemically pure nitrate of silver, and as the commercial article is often adulterated with nitrate of potash to such an extent as to contain only about half the proper amount of silver, it may be well to make it by dissolving pure silver in nitric acid, and evaporating to dryness in a clean dish.

It takes very nearly seventeen grains of nitrate of silver to precipitate six grains of chloride of sodium (common salt,) the precipitate consisting of chloride of silver, nitrate of soda remaining in solution. The reason why these relations of quantities exist in these particular substances, depends on the so-called atomic weights of which they are composed. and may be learned from any good text book on chemistry, If now we dissolve 8x17 or 136 grains of nitrate of silver in an ounce (480 grains) of pure water, it will precipitate 8x6 or 48 grains of common salt, that is, 480 grains of this water will precipitate this amount or every drop the tenth part of one grain of common salt; as a drop is very nearly the 480th part of the quantity of one ounce. This is our standard solution by which we may test all chlorides. If now we take one ounce of the water to be analysed, and drop carefully this standard solution in it, every ten drops required to form a precipitate will indicate one grain of common salt, and a single drop the tenth part of one grain of common salt in an ounce of the impure water.

As four grains of nitrate of silver precipitate very nearly one grain of chlorine or free hydrochloric acid each drop will indicate one fortieth part of a grain of these substances

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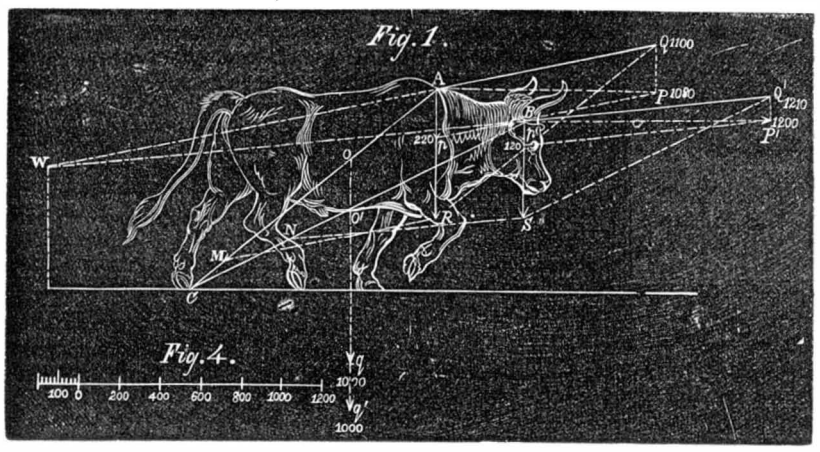
For the Scientific American.

THE BEST WAY OF YOKING OXEN.

Of the three different methods by which the ox is yoked in applying its muscular power as a moving force, the intention of the present article is to determine which is the best adapted to the desired end, or, in other words, how we can employ the ox so as to obtain the greatest amount of work with the least possible degree of inconvenience and fatigue to the animal. The ordinary and almost universal way in this country is to place a collar or bow on the neck so that the ox drags with the shoulder in the same manner as the horse. However well adapted this may be for the horse, it is manifestly unsuited for the ox. That fitting resting place for the collar which the shoulder of the horse presents, is not found in the ox. The ox also carries the head lower, and the bow has then a tendency to rise and come forward at the upper portion and bear entirely against the joint of the leg and shoulder, which has considerable movement and is only lightly covered with flesh. The use of this method, then, involves a considerable amount of unnecessary pain and uneasiness. Second, the most objectionable place of applying the yoke on the ox is on the top of the shoulder bones at the root of the neck. These bones and the top of the backbone being also provided with but little flesh under the skin, present to the yoke sharp ridges, and the animal consequently suffers a hard rubbing pressure on the skin and the sensitive nerves of the back bone. The yoke will likewise rock on these sharp ridges, and has a tendency to slide off. It is also observed that the animal while pulling his load along will constantly move his head up and down, and from side to side, thus expending much of the power to no purpose.

The third and most reasonable and natural method seems to be to put the pressure on the forehead, as we shall endeavor to illustrate. When we apply the draft to the forehead by means of a yoke placed on the neck immediately behind the horns, and a strap running from both ends of the yoke over a cushion placed on the forehead, and secure the side straps or draft ropes to both ends of the yoke, we have a perfectly immovable fixture and the animal will not be disturbed by friction and pressure on sharp edged bones. The backbone near the joint to the head being covered with thick layers of flesh, gives a broad support to the yoke, which is of some importance as there will be some downward pressure on the same. This downward pressure is one component of a power, acting on the yoke in the direction of the foot of the stretched out hind leg, tending to bend the neck down toward that foot and it will not be inconveniently resisted. An ox when attacking an enemy, attempts to take the shock on the horns; and by placing forehead against forehead ability is frequently shown of pushing back an animal of nearly equal weight. Thus nature has clearly shown how we should put an ox to work; the main strength is placed in the neck and use is made of this strength, whenever attacking one another.

By means of the accompanying diagram Fig. 1, we intend to show, according to the rules of mathematics and irrespective of the convenience to the animal, that the yoke is attached by the head with far greater advantage than when against the top of the shoulder bones.



The diagram represents a well proportioned animal in position to work or push a load along. W represents the place of the whiffle-tree to which the draft straps are attached; A, the point at which the yoke is placed in the second case mentioned; B, the forehead; W A and W B, the draft-straps in both cases; C A and C B, lines from the foot of stretched out hind leg to yoke. o q and o' q' represent vertical lines through the centre of gravity of the animal and in length according to the annexed scale equal to the weight of the animal, say 1,000 pounds.

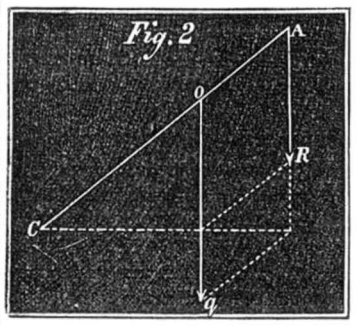
While the animal is pushing on his load, he maintains the represented position by means of the strength of the sinews, and in order to make a mathematical calculation, we shall suppose the animal in this position to be inflexible, so that we have to mark only the points A, B, and C, the lines A C and B C, the points o and o' in which the lines A C and B C are intersected by the lines o q or o' q', the length of the lines o q and o' q', and finally the direction of the side-straps A W and B W.

A C and B C represent levers. At the upper ends, A and B, of these levers the side-straps are attached. These side-straps are represented by the lines in both cases respectively A W and B W, and along these lines on the points A and B of the levers the load will act in the directions from A and B toward W, and tend to turn the levers upward about the point C. The weight of the animal represented by the lines o q or o' q' drawn through the centre of gravity acts vertically on the points o and o' and of levers, A C and B C, and tends to turn the same downward.

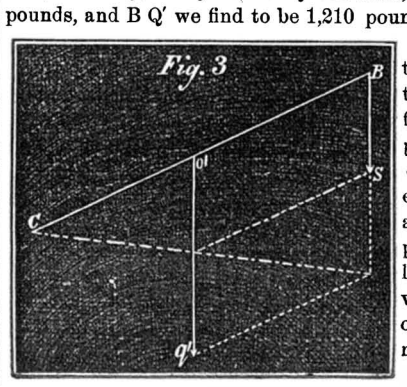
In case the load is such that the strain along the side straps is as much as the animal is able to resist, we have the levers, A C, or B C, in an equilibrium, neither to be turned up or down by the contending powers, o q, or o' q', and those along the lines, A W and B W. In place of the powers, o q, or o' q', acting at the points, o or o' we can, according to the rules of mathematics, place the powers, A R and B S, acting at the points, A and B, of the levers, A C and B C. The length of the lines, A R and B S, we have found by means of diagrams, Figs. 2 and 3, in which the lines, A C, o q', A R, and B C, o' q', and B S, are parallel, and equal to those of diagram, Fig. 1.

We have now in one case a vertical power, represented by line, A R, acting at point, A, of line, A C, and in the other a power, B S, acting at point, B, of line, B C.

According to the teachings of mathematics, one power represented by a diagonal line of a rectangular or acute angular parallelogram is equivalent to two powers represented by the two sides, all emanating from the same corner. This principle we have applied to diagram, Fig. 1, and to the diagrams, Figs. 2 and 3, which we have given separately to obviate overcrowding of lines. We applied the principles of leverage, the powers being in reversed proportion to leverage.



In one case we have now, power, A R, acting at A, equivalent to the two powers, A M, which is to be overcome by the muscular power of the animal and A Q, or the draft along the side straps. In the other case we have the similar powers, B S, B N, and B Q'. A Q we find by our scale, Fig. 4, to be 1,1000 pounds, and B Q' we find to be 1,210 pounds.



By another application of the rule of the parallelogram we find the power, A P, parallel to the load, or the effective power to push the load along, to be 1,080 pounds, or equivalent to A Q, and a vertical power, A p, or pressure on the neck of the animal.

In the same way we find, in the other case, the effective power, B P', to push the load along, to be 1,200 pounds, or equivalent to B Q', and a vertical power, B p', or downward pressure on the head of the animal.

By the scale we find A p to be 220 pounds in the one case, and B p' to be 120 pounds in the other case. Now, to compare our figures, we have:

As 1,080 is to 1,200, so is 100 to 111. By applying the yoke to the head there is a gain of effective power to push the load along of eleven per cent. over the effective power to push the load along when applying the yoke against the top of the shoulder bones.

Further, we have in the latter case a useless pressure to be sustained by the animal of 220 pounds, and by applying the yoke to the head this pressure amounts only to 120 pounds. As we have shown above, this downward pressure on the head will be easier sustained by the animal than the other by applying the yoke at A.

Suppose, now, the animal is able, by yoking as described under the second method, with the effective power of 1,080 pounds, to push along on a smooth road a load, supported on a wagon, of 2,000 pounds, it will be able, by yoking at the head, to push along, with the effective power of 1,200 pounds, eleven per cent., or 220 pounds more, which is a load of 2,220 pounds.

It will be seen that we gain effective power in the last over that in the second case, because the draft straps are nearer to a parallel line with the road, while the downward pressure is diminished from the same reason.

A further advantage of yoking by the head, consequently, is the ability of the animal to regulate the inclination of the draft straps by raising or lowering the head to suit the unevenness of the road.

To use a double yoke seems in any way to be a torture, and the advantages shown under the last case, by using a single yoke with side straps would greatly be reduced by using the double yoke found in some districts of countries.

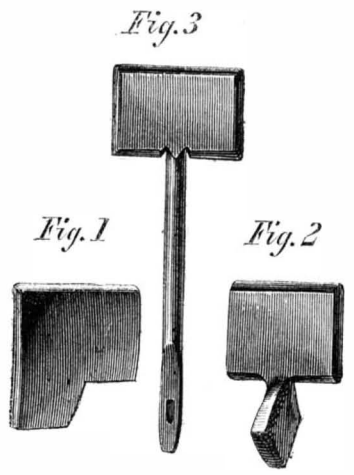
EDWARD WOLFF.

New York city.

RICHARDSON'S PATENT METHOD OF FORGING HOES.

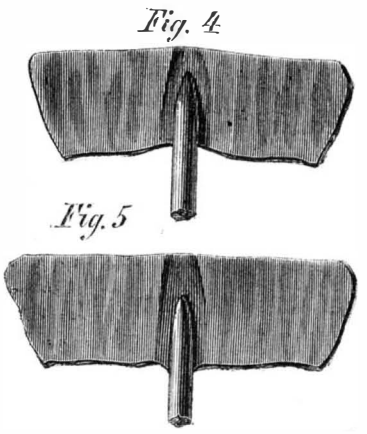
The inventor of the improvements in the processes of manufacturing hoes, illustrated in the accompanying engravings, says that after twenty-seven years' experience in the manufacture of hardware implements, he believes he is safe in saying there is not so much waste of stock and labor in any department of industrial mechanics as in the manufacture of hoes. He saw, a short time ago, a pile of at least one hundred dozen waste or refuse hoes in one manufactory, the remains of only six months' work.

The method of cutting the steel used in forging a hoe generally practiced, is to cut squarely off from the bar sufficient to make two hoes with their shanks, the stock being drawn down in the middle to make the two shanks, and then cut in two. By this plan it is impossible to shoulder down squarely and do the work properly; none but the most skillful being competent, and thus there is great waste.

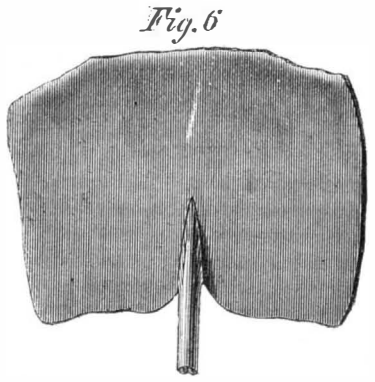


The writer, after a succession of experiments, has adopted the following improvements in preparing the stock:

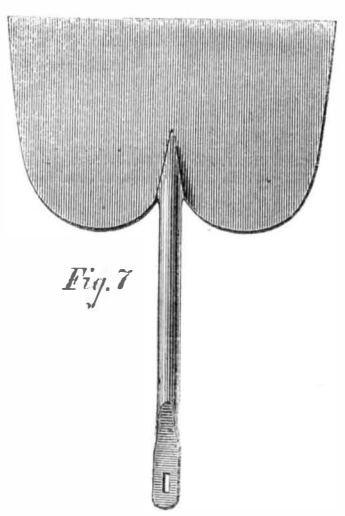
The better method of cutting the steel is that shown in Fig. 1, by which not a particle of the stock is wasted. It will be seen that two of these figures, when joined at the lines of



separation, form a parallelogram. Fig. 2 shows the second process, which is to cut in on the whole side, giving a quarter turn or twist to the adhering portion, and then to draw that part out under the trip to form the shank, as seen in Fig. 3.



Next comes the process of spreading, as seen in Fig. 4, known as "plating" among the craft, a work done only by the skillful. In some manufactories it is done by rolling, which facilitates the work, but does not always obviate the difficulty of giving a proper form to the ears. Fig. 5 is an



extension of the process seen in Fig. 4. Figs. 3 and 5 obviate the difficulties heretofore experienced, as they do away with the necessity of plating up the ears of the hoe before rolling. Thus prepared, the hoes come out uniform, as seen in Fig. 6, when the hoe is ready to go to the press to be trimmed and prepared for the temperer, as seen in Fig. 7. By these processes every hoe is perfect and alike.

This principle of cutting out and forming hoes was patented through the Scientific American Patent Office, May 26 1868, by L. T. Richardson, who may be addressed at Clayville, Oneida Co., N. Y.

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AN ENGLISH ECONOMIST ON RAILROAD REFORM.

The conveyance of letters by post is one of the few industrial enterprises which can only attain its highest perfection by being placed under governmental control. The regularity and precision which are absolutely indispensable for the proper working of the postal system, together with safety and expedition in transmission and delivery of mail matter, and the faculty of realizing an immense revenue with a minimum and essentially uniform rate of tariff, are advantages which, on such a grand scale, could never be attained by individuals nor corporate bodies. Such success attending the working of the postal system, it is quite natural that the idea should suggest itself of putting the coadjutor of the post—the telegraph service—on the same basis. In Belgium, the system has always been under the control of government, one tariff, and that a very moderate one, being charged for the transmission of despatches throughout the kingdom. In Switzerland, likewise, the telegraph lines are the property of the state. A strong movement has recently been made in England to make the British lines government property, the experience gained in the two continental countries before referred to being urged as proof that under a general and more economical system, the lines can be and have been worked at rates greatly reduced below those charged when owned by private companies, and yet with a large profit to the government. The measure has of course met with determined opposition from the existing telegraphic companies, but what its fate has been, we are unable to say. A resolution looking to substantially the same end as the English movement was some time since introduced into Congress but we believe no action has ever been taken upon it.

An English economist has issued a pamphlet in which he proposes to make even the railroads of the kingdom government property, to be regulated and managed as is the postal service. We have on several occasions stated the purposes of an organization in this country for making the freight railway lines the property of the different States, but Mr. Brandon, the author of the plan under consideration, goes still further than either what Mr. Quincy of Massachusetts, or the American Cheap Freight League has proposed. In a pamphlet entitled "How to make Railways Remunerative to the Shareholders, and Beneficial to the Public" the writer seeks to show that the public have not yet obtained the full benefits to be derived from railway traveling, as well as that the shareholders might reap advantages in proportion to those conferred upon the public by the adoption of a better system. These desiderata, it appears to him can only be accomplished by the government taking up all the railways in the kingdom. He estimates that the average profits of the British railways are 4 2-5 per cent, and suggests that railway shares should be exchanged for government railway stock, bearing 4 2-5 per cent. guaranteed interest, the price at which to convert the shares being the average price for the past seven years. Government is to unite the whole of the railways under one general management, so that they should become a recognized branch of the public service available for the whole population.

Further: Mr. Brandon proposes to establish one uniform price on every road, carrying passengers one journey of any distance in one direction for the equivalent of twelve, twenty-five and fifty cents, for third, second, and first class passengers, respectively, estimating that at these rates six times the number of passengers would be carried, at small, if any additional expense. He calculates—with an exactness which is certainly surprising—that 755,879,586 passengers would travel annually with single journey tickets; of these one-seventh would be first-class, two-sevenths second class, and the remainder third class passengers, yielding an aggregate income of $133,000,000. The fares for single journeys are to be paid by government stamps, which are to be issued like postage stamps and delivered up on the completion of the journey; a passenger not provided with a ticket to pay double fare. Mr. Brandon regards his scheme as the completion of the postal system, and refers to the advantages already derived from the letter, book, and sample post, and to be anticipated from the annexation of the telegraph as evidence of the benefits derivable from the development of his project.

Editorial Summary.

"BDELLATOMY" is the name given to a curious practice lately introduced into Germany, whereby the efficiency of a leech in blood letting is greatly increased. This result is effected by making an incision in the side of the animal, which serves as an outlet, while, unconscious of the rupture, the leech continues vigorously sucking until the patient has parted with an ounce or even double that quantity of blood from a single application. The cutting is made preferably on the left side of the leech, and at the moment when the gormandizer has nearly filled himself to repletion. The operation must not be regarded as an act of cruelty, but quite the reverse, as serving a good turn for the animal in allowing him the means for prolonging his rich feasting almost indefinitely. After being removed from the patient, if carefully treated, the leech can be kept until the wound is healed, and in this way several incisions may be made in one animal.

METEOROLOGICAL.—Those who have lamented the supposed extraordinary amount of rain that has fallen this year, will be surprised to learn that for the first six months of 1868, the amount of rain and melted snow in this latitude was 4·75 inches less than last year, though being in excess of the average for thirty years past, of 3.03 inches. In the mere number of rainy days, however, this season has been remarkable, statistics proving that considerably more than half the number of days during this period were rainy, the wind blowing meanwhile from some point in the east on 133 out of the first 172 days of the year.

ONE of the most interesting cases of chemical synthesis recently published is that in which Mr. W. H. Perkins has succeeded in producing artificially the odoriferous principle of new hay. Naturally, the delicious fragrance of freshly mown grass is due entirely to the presence of the species of graminæ known to botanist by the name *anthoxanthum odoratum*, but ordinarily called sweet-scented vernal grass. The same substance constitutes the flavoring principle which the Germans employ in making their favorite beverage, May wine.

IT has been found by experiments that a stream of electricity derived from a powerful electro-magnetic machine, driven through a solution of brown unrefined sugar, will bleach it, electricity being thus made to perform the function of charcoal. It appears that one of Wilde's electro-magnetic machines, driven by a 15-horse power engine, has been set up for this object in a sugar refinery in Whitechapel.

EUROPEAN PATENTS are obtained through the SCIENTIFIC AMERICAN office in Great Britain, France, Belgium, Holland, Prussia, Russia, Saxony, Austria, Bavaria, Würtemberg, Italy, Spain, and in Provinces wherever patents are allowed. We invite careful attention to our facilities for procuring *Foreign Patents*. We have offices in London, Paris, Brussels, Berlin, through which we are able to prosecute claims with the utmost dispatch, and at prices less than are usually charged by other solicitors. Parties having applications to make will find it for their interest to consult with Munn & Co.

FISH CULTURE.—Seth Green is breeding fish in Western New York and at two or three points in New England. He is now at Holyoke, most actively engaged in propagating shad, and writes: "I am hatching about seven million shad every day." The Connecticut River, at this rate, will in two or three years, be thoroughly stocked with this superior fish. Mr. Green's example could be followed with great profit by others, who, with a little time and study, might acquire the whole art of fish breeding. There is no reason why the Hudson, Potomac, and numerous other rivers extending from the coast should not abound in shad.

THE NORTH GERMAN MERCANTILE NAVY.—The mercantile navy of the three Hanse-Towns consists of 795 ships of 204,589 tuns burden; the Grand Duchy of Mecklenburg-Schwerin, 447 ships with 52,452 tuns; the Grand Duchy of Oldenburg, 190 ships with 26,863 tuns. The fleet of these five States comprises in all 1,432 ships with 287,904 tuns. The complete mercantile navy of Prussia alone numbers 5,413 ships, with 321,987 tuns. The united mercantile fleet of the North German Confederation consists of 5,845 ships with 609,891 tuns.

THE PRODUCTION OF PHOSPHORUS by a direct process from phosphate of lime, is the invention of two French chemists. Apatite, bone, or any other natural phosphate of lime, is mixed with twice its weight of sand, both being powdered. To the mixture is added 25 per cent of the weight of phosphate of charcoal dust, the whole being heated in a retort to an orange-red heat. At this temperature phosphoric acid is set free, and being reduced by the charcoal, the phosphorus is collected in the ordinary manner.

THE ALBERT MEDAL, which was instituted to "reward distinguished merit in promoting arts, manufactures, or commerce," has this year been awarded by the Council of the Society of Arts to Joseph Whitworth, of Manchester.

Hydrophobia Cured by Salivation.

A new remedy for this most distressing of maladies, comes from Northern India, and is attested by the medical officer at the Hooshiarpor Charitable Dispensary. "The patient on admission was suffering from violent and frequent attacks. He was tied on to a chair, surrounded with blankets, leaving the head free, a large vessel of boiling water was placed under him, and a mixture of equal parts of mercury and sulphur well rubbed together were placed in a broken piece of chatty over a charcoal fire, and put alongside of the vessel of boiling water; 15 grains of calomel were given at once, and 5 grains repeated every hour, the mercurial vapor bath being kept up till all symptoms subsided. In about four hours the man was perfectly calm and free from bad symptoms; he was removed from the chair and placed on a bed. The after treatment was simply tonics, nourishing food, and gargles, etc., to remove salivation. On the 13th he was discharged cured."

The Loss of Power by the Crank.

The crank is simply a mechanical medium of transmitting motion, or rather of transmitting the direction of power. No loss of the power has ever been discovered by the use of this means, and no real advantage gained by the substitution of other means of changing rotary into rectilinear motion, or *vice versa*. Practically, the speculative objections against the crank with the experiments based on them have never produced any device superior. The continued battle carried on against the crank, as a means to the end in view, has always ended in the discomfiture of the aggressor; the best method would seem to be to produce a new device and prove its superiority to the crank. The discovery will be welcomed by every earnest and honest mechanic.

Modern Gunnery and What it can do.

Some interesting practice was carried on the other day at Shoeburyness with the twelve inch muzzle loading rifled gun of twenty-three tons, firing common shell of six hundred pound weight, with the ordinary charge of sixty pounds of powder. The gun is mounted on a wrought iron carriage and platform, placed on a turn table in rear of a wooden structure representing an iron fort, through the portholes or embrasures of which the gun is laid and fired. The object was to ascertain how quickly the gun could be loaded, aimed, and fired by an ordinary detachment of one officer, one non-commissioned officer, and seventeen gunners. The gun was carefully laid each round at a small target one thousand yards' distance, and five rounds were fired in seven minutes and thirty-nine seconds, or at an average of one minute and thirty seconds for each round. The practice was excellent. We leave our readers to imagine what would have been the effect produced on an enemy's ironclad had she been under the above fire with Palliser projectiles fired with battering charges. She would have them struck every time, and in less than eight minutes would have received from one gun alone the impact of 3000 lbs. of iron, representing a total "energy" of 24,300 foot tons.

A Great Tunnel.

The project has been revived in England of tunneling the channel to France. Evidence has been obtained that the soil over which the sea flows is white chalk, gray chalk, and green sand further below. This fact was ascertained by borings on the English and French coasts, the two points on each side of the channel being not more than twenty miles from each other. It is but reasonable to suppose that the same material will form the submarine soil from coast to coast. The chalk can be easily worked, and the expense is placed at $50,000,000, gold, twice the cost of the Abyssinian war.

The project of bridging or tunneling this ugly channel is, to say the least, a very doubtful one, but extensive docks might be erected, and much larger and more comfortable steamers put on than the miserable, sea-sickness engendering tubs at present in use. With properly constructed vessels and docks, cars might be run on to boats and easily transported across the channel. The present system seems to us a needless cruelty.

THE peat speculation is unprofitable in Connecticut. The *Hartford Times* says: "Losses have occurred in this and Tolland counties to the extent of about $150,000 in this speculation, and large sums in other parts of the State."

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

MECHANICAL MOVEMENT.—James See, Mitchell, Ind.—The object of this invention is to furnish a device by which the application of motive power to machinery may be so regulated, controlled, and directed, in conjunction with a set of weights, levers, and ratchets, that a great saving of power shall be effected thereby, enabling the operator, by any given amount of power at the main shaft, to obtain results at the point where the power is to be used, exceeding, by nearly one hundred per cent, the results of any other apparatus hitherto invented for a similar purpose.

PAPER RULING MACHINE.—Wm. S. Wilder, New York city.—This invention has for its object to furnish a simple, convenient, and accurate paper ruling machine for ruling bill heads, etc.

CULTIVATOR.—Major E. Hanover, David D. Bailey, and Fordyce M. Harwood, Lamoile, Ill.—This invention has for its object to furnish an improved cultivator, easily and quickly adjusted, and effective in operation.

NAIL EXTRACTOR.—J. B. Breathill, Arrow Rock, Mo.—This invention has for its object to furnish an improved nail extractor which shall be simple in construction, durable, and cheap.

MACHINE FOR SAWING STAVES.—Miller J. Hine, Equality, Ill.—This invention has for its object to furnish an improved machine for sawing staves, which shall be simple in construction, effective in operation, and convenient in use.

LATHING MACHINE.—O. C. Macklett, Saint Paul, Minn.—This invention has for for its object to furnish an improved machine by the use of which laths may be attached to the scantlings and joists more rapidly and accurately than is possible when the lathing is done in the ordinary manner.

CHURN AND ICE CREAM FREEZER.—Charles Higley, Port Byron, N. Y.—This invention has for its object to furnish an improved machine so constructed and arranged that it may be used with equal facility as a churn and as an ice cream freezer, and which will do its work in either capacity more thoroughly and quickly than it can be done with the machines ordinarily used for these purposes.

HANDLE FOR SAD IRONS, ETC.—Stephen H. Cummings, Norway, Me.—This invention has for its object to furnish an improved handle for sad irons, tailors' goose, stove cover lifters, and other metal articles, which it is necessary to handle hot, and which shall be so constructed as to prevent the hand piece from becoming hot, and protect the hand from the heat radiated by the object lifted.

VARIABLE CUT-OFF FOR STEAM ENGINES.—James McPherson, Brooklyn N. Y.—This invention relates to a new variable cut-off for steam engines which is connected with the governor, so that it will be automatically adjusted as the pressure of the steam comes above or below a certain desired degree.

HOP PRESS.—Henry Taylor, Middletown, Wis.—This invention consists of a of a stout frame, composed of two vertical posts and two horizontal beams, which compose the sides, top, and bottom walls of the same, the posts being jointed to the bedplate or beam in a manner to allow them to be spread out after the bale has been formed, to facilitate the release of the same, and provided with removable side planks, a follower, and operating screws.

COW-MILKING MACHINE.—L. O. Colvin, New York city.—This invention consists of a simple, cheap, and effective apparatus for operating the milking device, so arranged that the latter may be readily applied to the udder of the cows, while standing in any position within the stall, wherein the machine is arranged, and which may operate the milking device in a manner to assimilate the action of a sucking calf, either when the cow gives down her milk freely, or when she refuses to give it freely, as is sometimes the case.

EXPANDING REAMER FOR PETROLEUM AND OTHER ARTESIAN WELLS.—A J. Salisbury, San Buenaventura, Cal.—This invention relates to a method of expanding branches of a well reamer by a positive downward thrust of the superincumbent shafting by which the reamer is actuated in the operation of reaming, and consists of a toggle joint attached to and between the said branches at certain suitable distances from the points of the cutter and operated by the direct vertical thrust of the shafting to which the reamer

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is attached, acting upon a shank pivoted to the toggle joint, together with other devices perfecting the whole.

WRENCH.—Wm. Bradshaw and Chas. Lyon, Delphi, Ind.—The nature of this invention relates the class of wrenches generally called "monkey wrenches."

WATER CLOSET.—George Conron, New York city.—The object of this invention is to provide a simple and effective water closet, whereby the hinged pan and other complicated devices, which are expensive and liable to get out of repasr, are dispensed with.

MOWER AND REAPER.—Darius Babcock, Warsaw, Ill.—This invention relates to a new and improved method of constructing machinery for mowing and reaping, whereby the same is more economically done, and whereby also the machines are made more certain in their action and are rendered more durable and less likely to get out of repair.

BROADCAST SOWING MACHINE.—Alfred B. Beaumont, Grand Rapids, Mich.—The object of this invention is to perform the sowing of grain or fertilizing material in a regular and rapid manner. The machine is provided with devices for adjusting the quantity of material sown as well as the direction and distance to which it is projected.

MEDICAL COMPOUND.—A. J. Hobb, Van Wirt, Ga.—The object of this invention is to provide a vegetable medicine for treating gonorrhea, syphilis, and other venereal diseases, and also for the treatment of uterine affections, and other disorders of the female genital organs. It is also a valuable tonic, to brace the system when reduced by excessive venery or debilitated by chills and fever or other malarious fevers. It is also an excellent palliative for rheumatism and kindred disorders.

CARS, WAGONS, AND OTHER VEHICLES.—Thomas Stone, Plainfield, Ind.—The object of this invention is to accomplish the discharging of the contents of a wagon box, when such contents are of a loose character as sand, coal, and the like. The invention consists in forming the bottom of the box of shutters or leaves extending across the box and pivoted to the same by means of journals or gudgeons working in holes in the wagon box.

HAY LOADING DEVICE.—N. B. Douglas, Cornwall, Vt.—This invention relates to a new and improved device for raking up and loading hay upon wagons, and has for its object the obviating of hand labor in pitching hay on wagons. The invention consists in a peculiar construction and arrangement of parts, which form an attachment capable of being applied to the rear part of any ordinary farm wagon, and so as to operate in the most efficient manner.

SEWING MACHINE.—A. Q. Allis, Dayton, Ohio.—The nature of this invention consists in the arrangement of a coil spring as the moving power of a sewing machine for ordinary domestic use, in order to dispense with the treadle for operating the machine with the foot, as usual, together with a device for regulating the motion.

LETTER POUCH.—P. Davis, Newport News, Va.—This invention relates to a new and improved letter pouch, and it consists in forming the same with a flap and a band or a slit to receive the end of the flap. The exterior of the pouch is ruled or lined off at equal distances apart, and the several spaces are numbered, and the names of the places or addresses written or printed upon them.

HORSE RAKE.—C. E. Murray, Sugar Valley, Pa.—This invention relates to a new and improved revolving wire tooth horse rake, and it consists in a peculiar means employed for holding the rake and revolving the same at proper intervals, in order that it may discharge its load, and also in a certain means to allow a vertical play to the teeth, to admit of them conforming to the irregularities of surface over which they may pass.

REEL FOR BOLTS.—Joseph G. Harris, Gravois Mills, Mo.—This invention relates to a new and useful improvement in the construction of reels for bolts. The object of the invention is to admit of the bolting cloth being stretched uniformly at the inner sides of the ribs of the reel, whereby all obstructions to the free passage of the flour through the bolting cloth are avoided, and the flour separated from the bran and coarse particles of the meal by a sifting process solely, and not by the raising of the meal and falling of the same within the bolt as it rotates, as is now the case, owing to the ribs which are at the inner side of the bolting cloth catching the meal and operating upon it in that way, and which leaves more or less fine bran to be forced through the bolting cloth that would otherwise pass out with the coarser portion at the tail of the bolt. The bolting cloth also is liable to become choked and clogged up with this fine bran.

TIE OR FASTENING FOR SHEAF BANDS, BAGS, BALE HOOPS, ETC.—Edward Truslow, New York city.—This invention relates to a new and improved tie or fastening for sheaf bands, bags, bale hoops, etc, and it consists in bending or forming a piece of sheet metal, or casting a piece of metal in such form that a string, wire, or metal hoop may be secured in it with a very simple manipulation, one end of the string, wire, or hoop being attached to the tie previously to its application to the article to be bound or tied up and the free or disengaged end secured in the tie or fastening after it is passed around the article to be bound or tied up.

VENTILATING AND HEATING BUILDINGS.—E. L. Roberts, New York city.—This invention is designed to accomplish perfect ventilation in all parts of a room or building, whether large or small, and a uniform heating of the same at all times and seasons, by causing a constant, steady, and uniform flow of fresh air into and through the room in a manner to be diffused throughout the whole space, and take up and carry off all impure and noxious air or vapor that may be discharged into the room from any cause.

WHIP.—Dexter Avery. Westfield, Mass.—This invention relates to a new whip, and consists in forming the outer covering of the same by threads, which are interwoven like regular fabric, instead of being braided as usual,

MIXING MACHINE.—J. B. Peterson. Brooklyn, N. Y.—This invention relates to a new machine for mixing flour and other materials, and consists chiefly in the use of a revolving grate, upon which the material to be mixed is deposited, and when it is in minute quantities thrown off by centrifugal force Besides this plate there are also suitable stirrers employed.

HAMMER.—PETER C. Havely and Wm. W. Coggshall. Rensselaerville, Pa. This invention relates to a new and useful combination of certain tools with a hammer, whereby a very convenient combination tool is obtained, for carpenters' use; one which will facilitate labor by diminishing the loss of time in taking up and laying down different tools in the prosecution of carpenters' or joiners' work, and which, in many cases, will allow of one workman performing alone what now requires the aid of an assistant.

CLOTHES DRYER.—J. R. Watkins, Maine Prairie, Minn —The object of this invention is to furnish to the public a simple, cheap, and durable device for confining and holding the arms of a clothes dryer, and for supporting the same from the vertical walls of the room or building where the instrument is in use.

MILL STONE DRESSING MACHINE.—Azel Lane, Addison, N. Y.—This invention consists in the arrangement of a horizontal shaft which forms the axle of the pick handle, and which is provided with pinions on each end in a pair of sliding head blocks, which are caused to move back and forth on a platform; the latter also serve as guides for the head blocks, the motion being communicated to the said pinions by a hand wheel on the end of the shaft or by a worm gear on a counter shaft.

KEY BOARDS TO PIANOFORTES AND OTHER MUSICAL INSTRUMENTS.—J. S Allen and A. P. Wilkins, Allen's Grove, Wis.—The present invention consists in adding to the ordinary key board now in use, two or more rows, or series of shorter keys, which are placed immediately behind the long keys, and in the same line horizontal therewith through, and by means of which short keys a tone an octave higher or lower, as the case may be, than the key directly in front of it, can be sounded, and thus if two additional keys are used, enabling a tone to be produced two octaves higher than the original and front key of the series.

LUBRICATING DEVICE.—Lucius A. Dodge, Keeseville, N. Y.—This invention consists in providing a chamber within the stock to which the forging roller is received, and on which it is carried around the above axles provided with openings for supplying it with oil, and provided also with passages communicating with the axis of the said forging roller, and with packing of absorbent material, and set screws for compressing the said packing so as to regulate the flow of the oil.

MACHINE FOR MAKING HORSESHOE NAILS.—George D. Walcott, Jackson, Mich.—This invention consists in a novel construction and arrangement of parts, whereby, in connection with a heater or furnace, a machine is obtained which will work up into horseshoe nails a rod of any proper or desired length without any other work or labor than the introducing of the rods to the machine and the keeping of the fire in proper order.

ADJUSTABLE LEVEL.—Homer Lewis, Bennington, Vt.—This invention relates to a new adjustable spirit level, in which both the horizontal as well as the plumb ball can be regulated so as to be set when not true.

BEER HOPPING APPARATUS.—W. S. Haight, Waterford, N. Y.—This invention relates to a new apparatus for hopping beer, and for extracting beer from hops, and consists in the application of a stirrer in the extractor box, and of suitable pipes for drawing off the liquid and for preventing its overflow; also in the arrangement of a valve in the lower part of the apparatus for discharging the spent hops.

MACHINE FOR DRYING AND FINISHING TUBULAR FABRICS.—O. C. Sweet, Albany, N. Y.—This invention relates to a machine for drying, stretching brushing, heating, and calendering knit or other tubular fabrics, and consists in such an arrangement of all the parts, that the said fabric is completely finished and wound upon a roller, after having passed through the machine, provision being made that the straight direction of the meshes is retained, and that the fabric is not twisted or laid spirally, whereby the value of the article would be greatly diminished, and whereby it would be made to shrink when washed.

ICE PITCHER.—C. C. Foote, New Haven Conn.—This invention relates to a new ice pitcher, which is enameled on the inside, so that the metal cannot be scratched or injured by the ice, while the taste and quality of the water cannot be spoiled by the corrosion of the metal.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

C. J. H., of Ohio.—You are entirely mistaken in asserting that the appearance of solidity in the stereoscope is due to one lense having a shorter focus than the other, or that this causes one picture to appear before the other. The two lenses of a stereoscope are, and ought to be perfectly alike, but the pictures are different. The statement of the correspondent, page 391, Vol. XVIII., which you criticise is perfectly correct.

A. B., of N. Y.—The answer to A. J. G., of Conn., page 327, was not to the question of the cause of the appearance of solidity in the stereoscope, which is well settled at present, but to his question why a single photograph will often show this appearance as well, especially if seen through a magnifying glass.

W. D. B., of Mass., asks why the air in an air-chamber of a force pump or ram is not absorbed by the water under pressure. It is in many instances so, the air-chambers become entirely filled with water, and several patents have been taken out, to prevent or supply this waste of air. In some circumstances however, (turbulent water supply, leakage of pumps etc.) air bubbles are incidentally carried along with the water, and thus keep the air supply in the chambers.

D. W. D., of Troy.—A large body of the same material and form, will fall faster than a smaller one, as it offers to the resistance of the air a lesser surface in proportion to its mass. In vacuo a cannon ball fired upward would fall with exactly the same velocity as it ascends, the resistance of the air however, makes the velocity of descent less than that of ascent.

F. B. C., of Mass.—When gas is burned so as to give light, it will give less heat; when you burn it mixed with air (as is done in the Bunsen burner and in good cooking stoves) so that it gives little light it will give more heat. You may easily verify this, by trying to boil water over a common fishtail burner, or over a Bunsen burner, using exactly the same gas supply, it will take in the first case, more than twice the time that is required in the second.

J. E. H., of Wis.—If you study the subject of atmospheric pressure thoroughly, it will "patch up" your notions on that subject in such a way, that you will see that "Galileo and the SCIENTIFIC" are right and that you are all wrong.

J. T., of New Jersey, sent us sometime ago, a "document," in which he imagines to have demonstrated that there exists no gravity between the celestial bodies; we have now received an explanation of the tides founded on a "directly conflicting strain," in the motion of the earth. We advise our correspondent to study first the admirable theory of gravitation, as established by the greatest minds, after the most extensive research and profoundest study, before he sets up critisising Newton and La Place.

W. A. S., of Syracuse.—The prescription for tinning and soldering iron which you sent us is old, and at present known to almost every tinsmith; it was published in the SCIENTIFIC AMERICAN by a correspondent page 71, vol. XVIII. An improvement was made in it, in 1860 by Scheefer, in Germany, which consisted in changing it into a dough by the addition of starch, so that a sufficient quantity may be placed on the surfaces to be tinned or soldered, without which the operation often fails. We think it will give very poor results when used for mending knifeblades, it is only a tin solder.

W. H., of Pa.—Your inquiry about a fire-proof roof over boilers is partially answered by an article on such a covering, appearing elsewhere in this paper. The different low water indicators have all a tolerable fair degree of reliability, but should never entirely be depended upon, A watchful sober engineer is not only the most reliable safeguard against low water, but also against excess of steam pressure.

G. W. J., of Ind.—You misunderstand and misquote our article on page 393, vol. XVIII, on long and short screw drivers; we did not say that "all the advantages gained by a long screw driver is obtained by moving the handle out of the line of the axis of the screw," but we said: "the long screwdriver admits of considerable play from side to side without releasing the screw, while the short one admits of very little;" every one knows the annoyance of this slipping of screwdrivers with short handles, and the ease of turning those with long and heavy handles, and the steadiness of their position.

R. M., of Cal.—We agree that the fine bone dust as used for making opaque glue is not exactly the thing, but the addition to the glue of carbonate of soda, sulphate of zinc, and oxalic acid, which in fact form an oxalate of soda and sulphate of zinc, which you mention, is of very doubtful utility; probably you have not tried it.

H. D., of Pa.—You will find the information you seek about nitro-glycerin on page 87 of our last valume. It is a dangerous substance in the hands of inexperienced persons.

J. B. of Ohio.—The idea that a little quicksilver put into a millpond, would cause the dam to break is entirely erroneous; it will simply sink in the interstices of the bottom, and there remain. It would take an enormous amount of quicksilver by its pressure and weight at the bottom, to injure even a very small dam.

J. B. F., of R. I. asks: "Has the common suction pump any advantage over the lifting pump? Suppose we have two pumps by which it is required to raise water a certain distance. One is an ordinary suction pump, the barrel and pipe of a given size the other is a lifting pump, where the piston is placed in the water, barrel and pipe the size of the other, lever of both to be alike. Now can not a given quantity of water be raised with less power by the suction than by the lifting pump?" Where the valve box of the pump is placed under the water the whole weight of the column of water must be lifted by the mechanical means employed; *i. e.* by the direct application of the power. This is what our correspondent calls a "lifting" pump. In the "suction" pump the pressure of the atmosphere can raise the water about 30 feet without mechanical power. The conclusion is obvious.

J. A. W., of —, believing boiler explosions and ruptures to be occasioned by unequal tension of the iron—unequal expansion and contraction by unequal heating—proposes that the boiler, after being put together, and before the calking is done, should be subjected to a red heat that the plates and rivets may accommodate themselves to their positions; after which the caulking should be done and the hydraulic test for leakage applied. The plan of heating or annealing boilers is not new, but we do not yet understand that it has proved to be of real benefit. We cannot see how the equal heating of a new boiler can prevent the after action of un equal expansion and contraction.

A. K. S., of Ohio.—The question of wages paid to mechanics and that of the fees charged by professional men are so different in their character that a discussion of the subject could be of no practical value. The work of a mechanic is usually of much more value to the community than the services of a professional man, but circumstances change the character of the service. There can be no fixed rule of comparison.

A. P. S., of Me.—"Is it possible to separate cotton from wool or hair after they are interwoven? Can it be done by rotting it? If so how?" It is not possible by any process known to us to separate cotton from woolen fiber sufficiently clean for any purpose except chemical analysis. A lens and a pointed instrument are the means for effecting such separation on a small scale.

J. W. K., of La.—"In smothering the flame of some burning tallow, contained in an open vessel, the flames were extinguished below, but continued to burn near the ceiling for some moments, finally exploding with a report like the discharge of a pistol. Will you please give an explanation of the above?" Flame is incandescent gas. When tallow is sufficiently heated, an extremely inflammable gas is generated, which when mixed with proportion of atmospheric air is highly explosive. The continuation of the combustion after it was extinguished below, the final explosion is thus accounted for.

J. C. B., of Ky.—The conversion of cider into vinegar may be hastened by leaching it through beech shavings, grape stalks, birch twigs, or cobwebs previously soaked in vinegar and placed in properly constructed tubs, the apartment in which the operation is performed being kept at a temperature of from 80° to 100° Fah. Skum and other impurities not dissolved in the vinegar may be removed by filtering. To make a pale bright colored vinegar from dark sorghum, you should first decolorize the sorghum molasses by passing it through bone black.

E. A. T., of Ill.—"Isochrone," or equal timed, is applied to the pendulum, when it does not oscillate in the arc of a circle but in a cycloid. In the first case oscillations in a large arc will occupy more time, in the second case, it is indifferent if the oscillations are small or large; it was invented by Huygens in Holland two centuries ago. The same word is applied to the hairspring or spiral attached to the balance of a watch, when it is so constructed that the so-called amplitude of the oscillations have no effect on the time occupied by them. This was the invention of Breguet in France, at the end of the last century.

J. A. P., of Wis.—That a person standing on a swing can start himself by pitching his body, is simply due to the fact that by pitching his body backward he moves his center of gravity backward, and as the center of gravity in a swing as in a pendulum will always tend to move under the point of suspension, the swing will move forward; for the same reason when pitching his body forward the swing will go backward, and so he may augment the pendulum motion by pulling the ropes which he keeps in his hands apparently against the direction of the motion, and he may counteract this motion by pulling apparently in the same direction as the swing when moving.

A. T. C., of Mo.—There are several varieties of hickory which explains why some trees put forth their leaves earlier than others. The difference in the varieties is only known to a practical botanist.

Business and Personal.

The charge for insertion under this head is one dollar a line.

Wanted—Purchasers for spool and bobbin wood. Address J. H. Lord, Box 773, New York city.

Stamped brass goods, small wares, steel dies, brass labels. Patent goods made to order. T. N. Hickcox & Co., 280 Pearl st.. N. Y.

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Wanted—Manufacturers of water wheels, circular saws, and mill gearing, to address J. P. Adams, Whitney's Point, N. Y.

Lathe wanted—2d-hand. Address Geo. C. Bailey, Pittsburgh, Pa.

General Foreman wanted, for a country manufactory, of a variety of articles from wood, iron, and brass. Should understand steam power, usual machine shop machinery, and management of help. Address, with references, experience, and pay desired, Box 3619. N. Y. Postoffice.

For Sale—adjustable watch and clock key patent—simple, effective—or parties to manufacture on royalty. Box 549 Burlington, Vt.

To patentees and others.—Brass, tin, and iron small wares of all descriptions made to order. Dies and tools made for metal cutting, stamping, spinning, and drawing. Tools on hand for the manufacture of kerosene burners, stationers' hardware, toys, etc., etc. J. H. White, Newark, N. J.

For sale—Valuable patent (pat. 1868), and machinery for making the same. Ready sales and large profits. W. J. Keep, Troy, N. Y.

For services of experienced detectives to obtain evidence against infringers of patents, address Box 581, Newark, N. J.

Eng., Pa.—You will find an important saving in using Broughton's lubricators and oil cups. They cannot leak or waste oil, and are in every respect the best. Address Broughton & Moore, New York.—A. S. Battles, and Schmidt Bros., Philadelphia, have them for sale.

A Superintendant competent to manage the mechanical part of a manufacturing business desires a situation. Is a mechanical engineer, familiar with building steam engines. Address "Engineering," Box 3421.

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Winans' Boiler Powder, for 12 years a positive remedy for incrustations, is so extensively imitated and pirated, by pretended agents, that it is not safe to buy except at 11 Wall st., N. Y.

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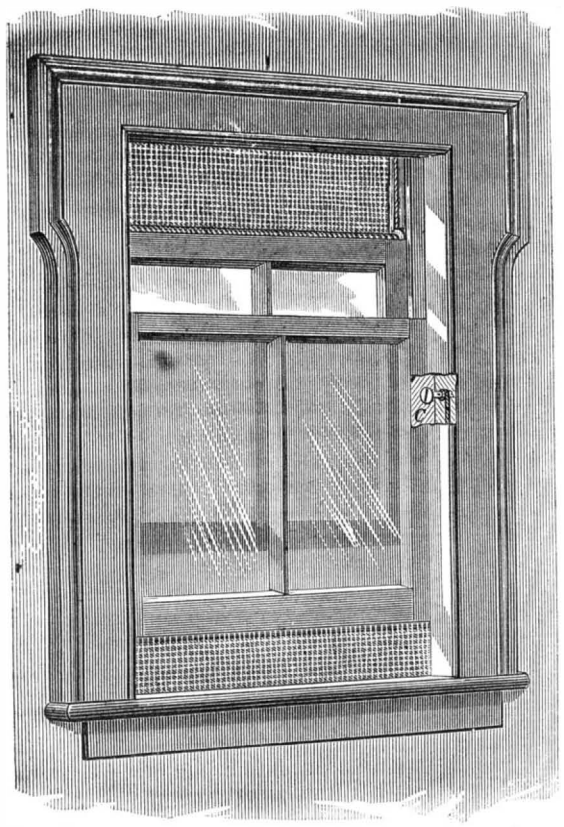
WARREN'S PATENT AUTOMATIC MUSKETO BAR.

The accompanying engraving represents a musketo bar for windows, applicable to either the upper or lower sash. It not only prevents the entrance of flies and musketoes, but adds greatly to the comfort of rooms by allowing the upper sash to be lowered and the lower one raised, which is always essential to ventilation. The contrivance is simple, durable and effective. It can be applied to any window, whether actuated by spring or weight. Its cost is slight, and its construction does not necessitate the change of appliances according to the season now demanded by the devices in common use. With this appliance a room can be kept free from insect pests without the costly and smothering nettings over beds and berths now required, while ample room for the admission and exit of air is afforded. Thus, it will be seen, that while it is adapted to use in dwellings, it is specially convenient for steamboats, sleeping cars, etc., adding much to the comfort of the traveling public.



In the transverse rail of the upper and lower sash a semicircular groove is made for the seating of the roller. The netting is wound around the roller, one edge being fastened to the frame of the window by tacks. On each end of the roller is a pulley operated by a stationary cord, which is fastened at the top and bottom of the sash. When either sash is closed no part of the machinery or netting is visible; but when the bottom sash is raised or the upper sash lowered the netting fills the space otherwise left open.

For convenience of opening the window to adjust outside blinds, the lower edge of the netting connected with the lower sash, may be secured to the window ledge by hooks and loops, or hooks and a wire stretched across, so as to be readily unfastened as desired, and as easily secured again to place.

The pulley, A, being as large as the roller when filled by the wound netting, will not let the netting over-issue, but keeps a tension sufficient to secure a perfect plane surface. The small pulley, B, runs loose when the roller issues the netting, and being as small as the roll when the netting is delivered, keeps a tension upon the netting and tends to take it up. If the cords should get slack they can be tightened or taken up by turning a screw, C, having a hole through its shank for the reception of the cord, as seen in the engraving, similar in operation to the screws on a violin, harp, or pianoforte. The action of the roller, A, can be readily understood by reference to the section, D. The design is well worthy the attention of housekeepers.

Patented through the Scientific American Agency June 30, 1868. All orders for State and County rights and all communications for information should be addressed to Warren & Co., No. 54 Pine street, New York.

PHILOSOPHY OF THE USE OF BLUEING IN THE STARCHING OF LINEN.

It is often worth while to think upon and discuss those things which are apparently of small importance. The laws of nature apply to small as well as to large operations, and the explanation of phenomenon of great importance may frequently be found in the investigation of trifling occurrences.

Mr. Ruskin, should this meet his eye, would no doubt smile, while he would acknowledge the truth of the statement, that the same natural principles, by the observance of which the great Turner (who he asserts was the only artist who ever did paint water true to nature), obtained his effects, include the one by which a washerwoman makes a bosom assume a whiteness of snowy purity.

All tints are hightened by transmitted light. No artificial pigments or dyes whatever can approach the glory of the prismatic colors; but if artificial colors are laid upon a transparent surface, and light permitted to pass through them, the effect of transmitted light will at once be seen. The stained windows of churches are good illustrations of the increased beauty of color by the transmission of light.

The effect of transparency may however be produced in some degree by artificial means. Light in passing through transparent substances is more or less separated into its primary colors by differences in thickness and density, and the form of the surface. Moreover the color of the transparent body itself has effect in the absorption of other colors, so that light rarely passes through transparent bodies unchanged. It took a long time to discover a means by which the dispersion of light, when it passes through the lenses of optical instruments, could be obviated, so that the image presented to the eye should exhibit the colors of the object inspected by their aid. It is obvious then that if a tint be added to a color so delicately that the impression produced by it does not change the original tint essentially, something of the effect produced by the transmission of light will be attained. The less of admixture with other colors any tint possesses, the more easily will light be transmitted through it; or perhaps it would be proper to say, that unless the mixture be so perfectly compounded that a distinct new tint is produced without a muddy crude appearance, the transmission of light will be more or less interfered with. This perfect blending is what is called by artists purity of tint. It is seen in perfection everywhere in nature, in the clouds, in water, in flowers, leaves, and fruit. An absolute white has a dead, dreary appearance, caused by the utter absence of the effect of transparency. It is, therefore, rarely used in ornamental work unless it be so placed as to be enriched by delicate reflections from adjacent objects. What is generally called a pure white has more or less of a very delicate yellow, green, or blue tint, the absence of which would be very sensibly felt, although its presence, as a tint, is scarcely perceived. This is why blueing is used in the starching of linen, though we venture to say, that the reason for it has rarely been thought of sufficient importance to repay analysis.

MILITARY TELEGRAPHS.

The Military Telegraph system now used in the U. S. Army is probably the most perfect in the world. At the recent examination of Cadets, at the U. S. Military Academy, West Point, N. Y., the operation of the Telegraph Corps attracted great attention. Wires were laid, and the telegraph put in operation at the rate of a mile in ten minutes. The best wire for such purposes is a fine steel wire, covered with copper. This makes a splendid line wire, and only weighs twenty pounds to a mile. A soldier starts off on the run, carrying on his back a couple of reels containing two miles of wire, which he lays along on the ground; he is followed by others, who carry and set the insulating stakes, attach instruments, batteries, etc. But ordinarily the wire is laid from a wagon carrying the reels from which the wire is unrolled, followed by the insulator wagon, and the instrument and battery wagon. Reels are also provided for use on horseback.

CHEAP FIREPROOF COVERING FOR STEAM BOILERS.

Many complaints are made that the common felting used to retain heat in steam boilers sometimes becomes charred and burned above the water line, when the boilers are so arranged as to be able to carry dry steam, or steam superheated to a slight degree, and that this constitutes a cause of danger for fire on board of steamboats. Nothing is easier than to cover a boiler with an incombustible and cheaper substitute, such as paper pulp, or the pulp of prairie grass or pembo, mixed with equal parts of powdered soapstone and half the quantity of asbestos; when this is mixed with a solution of silicate of soda or waterglass, it may be made into a thick paint or paste, which being applied to boilers in several layers or coats, will adhere strongly, and form a nonconducting covering. Waterglass which once had the reputation of being waterproof, does not possess this quality, but is fireproof, and at the same time a nonconductor of heat.

A SCOTTISH "CRAN-NOG."

During twelve years past great archæological interest has been centered in Scotland from the fact that in various parts of the country lake-dwellings have been discovered, which, though differing in size and structure from the Swiss and Italian lake-dwellings, are evidently sufficiently similar in idea, to form another link between the ancient populations inhabiting these widely-separated lands.

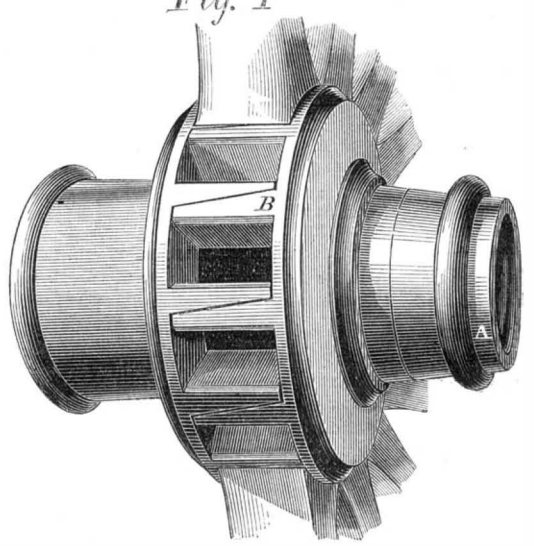
The first cran-nog was found upon draining a fresh-water loch in Arisaig. It appeared to have been placed in deep water, as the soft and wet mud around it is not fathomable by a long pole; the nearest point of land is about two hundred and fifty yards distant. It is formed of the trunks of trees, some of which are of very large size; one that was measured is twenty-eight feet long and five feet in circumference, at two feet from the base; another is thirty-nine feet long, and five feet eight inches at the base. The structure consists of several tiers or layers of these trees; two layers have been partially washed away by returning tides; four layers were exposed to view in examining the building, and a probe of eight feet long detected timbers at that further depth. Each layer in succession lies across the one below it, forming a strong, firm structure of rectangular shape; the sides are forty-three feet by forty-one feet. On the floor were several flagstones in three or four places, which evidently had been the fire-places of the inhabitants. At a distance of about two feet six inches from the building was a rampart, formed of upright posts, inclined inwards and sharpened at the top, across which are placed large trees that were fastened at the corners by a hollow scooped out of the wood.

THE PATENT METALLIC WHEEL HUB.

The two engravings show a patent hub for securing the spokes in carriage wheels, which was patented through the Scientific American Patent Agency, May 9, 1868.

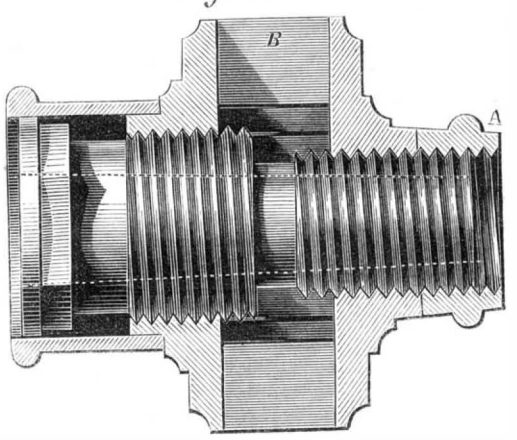
On the outside of the sleeve, which is of two different diameters, are cut screw threads, one engaging with one half of the hub and the other with the other half. On the outside end of the sleeve the cap, A, is screwed. Each half of the hub is funished with wedge-shaped radial projections, B, which, when screwed together, make a mortise for the spokes, holding them very firmly.

Fig. 1



The engravings present very plainly the peculiarities of the device. The rims may be made of good cast or malleable iron, or gun metal. The back band—that nearest the stock of the axletree—may be shrunk on the sleeve or threaded to screw on, as may be desired. If required, the front band or cap may be dispensed with by casting that side of the hub long enough to cover the thread on the sleeve. The practical wheelwright will understand how the mortises should be tapered to give the proper dish to the wheel, and he can have his patterns made according to his judgment. To drive the spokes it is necessary only to remove the caps from the finished hub and turn the box back two or three threads, enough to open the space from one sixteenth to one eighth of an inch, then drive the spokes, with slips of leather on the tenons of the spokes, if desired. Then the parts of the hub may be screwed up by a wrench and the flanges will hold the spokes locked as though dovetailed. If the parts of the hub are properly finished and the rim true, the spokes and the rim of the wheel will also be true.

Fig 2



For other information relating to this invention, and for rights for all the states, address Henry Poth and E. Deckenbach, 73 Diamond street, Pittsburgh, Pa.

The Centrifugal Machine.

In our article on the balancing of machinery, page 9, No 1, current volume, we inadvertently neglected, in comparing the amount of power required to drive the old and new styles of centrifugal machines, to notice the constant friction of the engine and shafting, which absorbed 16·04 H. P. This being deducted from 32·27, the power required to drive the seven old style machines, would leave 16·23 total, or 2·32 H. P. for each machine; and deducting from 23·48, the amount required for the new style, would leave 6·44 total, or ·92 H. P. for each self-balancing machine.

BLACK VARNISH.—An aniline black varnish, of recent Parisian production, is the following: In a liter of alcohol, twelve grammes of aniline blue, three grammes of fuchsine, and eight grammes of naphthaline yellow, are dissolved. The whole is dissolved by agitation in less than twelve hours. One application renders an object ebony black; the varnish can be filtered, and will never deposit afterwards.

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VOL. XIX., No. 3....[NEW SERIES.].... *Twenty-third Year.*

NEW YORK, WEDNESDAY, JULY 15, 1868.

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THE CAUSE OF STEAM BOILER EXPLOSIONS---THE BOWERY ACCIDENT.

One thing can be said of the verdict of the coronor's jury on the bodies of those killed by the recent explosion of a steam fire engine in this city, which cannot be said of all similar investigations. Much common sense was exercised by the jurors, and some intelligence. As usual in so-called investigations there were froth, foam, ignorance, brought before them, with a modicum of reason and educated intellect. The facts, aided by the statements of engineers, seem, in this case to have had some weight with the jury. We only wish their verdict could have more completely covered the ground.

Just here we wish to notice some of the nonsense which our journals published in relation to these occurrences; evidently written by anybody but a practical engineer. In this case one published statement was that the "steam gage was corroded;" another that the "tubes leaked;" another that only "sixty pounds pressure was on the boiler at the time of the explosion," and still another that the machine was a "perfect powder magazine." All such talk is not only sheer nonsense viewed from a professional standpoint, but it is really wicked, misleading old engineers and puzzling young mechanics. Not less to be deplored is the conflicting statements of men who should know whereof they affirm—not their opinions, but the results of their investigations. While one states that the rupture was caused or aided by a crack in the sheet, another says the sheet was perfectly sound. While one declares that the soot was burned off more than one half the fire-box, another knows there was no over heating of the iron. All this is nonsense, and there is more of the same sort shown in the reports of the testimony given before the jury.

The corrosion of a steam gage will strike our engineers as a new thing; that the leakage of tubes could produce an explosion will also interest them; that a boiler of the build of that which blew up could be even ruptured by a pressure of sixty pounds will amuse them, and that one of the Amoskeag fire engines is a perfect powder magazine under any circumstances would be believed only by those who have no knowledge of the excellence of material and perfection of work used and turned out by that concern.

In reviewing the testimony we cannot forbear a tribute to the straightforward and manly evidence produced by Messrs. Coffee and Powers. The former is well known as a competent engineer of large experience; the latter appears to be a thorough mechanic. No attempt has been made to impeach the testimony of either of these gentlemen. Both agree that the disaster was caused by an over pressure of steam, which a personal examination of the exploded boiler enables us to confirm.

The testimony of Mr. Bean, the superintendent of the Amoskeag works, Manchester, N. H., is somewhat of a curiosity if correctly reported in the daily papers. He says the boiler was braced from five to seven inches apart. Now if seven inches—area of forty-nine square inches—were sufficient, why put braces five inches apart leaving an area of twenty-five inches? But on an examination of the boiler we found a place on each side of the fire box that had nothing but "blind" stays in a space of eleven by eight inches, exposing a large space of three sixteenths iron without a support. In one of these places the rupture occurred. We cannot but think he is mistaken in saying that both the shells were of the same thickness. On our examination we thought the inner skin of the water leg was three-sixteenths, and the shell one-quarter, large. If Mr. Bean is correct then there may be some reason in Mr. Norman Wiard's statement that the shell was the weaker part of the boiler, a statement we take, however, *cum grano salis.*

To return to Mr. Bean; he says: "from the general appearance of the boiler I think the top part of the fire box and flues must have been nearly red hot." What reason has he for this statement? The morning after the explosion there was no reliable evidence of over heating or burning. The clinches or rivetings of the lower ends of the tubes had not started, the tube sheet bore a coat of soot, and the edges of the ruptured sheet were bright, which they could not have been had they been exposed to 400° of temperature.

Our conclusions are that the sheet that gave way was too thin to be stayed with screw stays; that the space between stays—eighty-eight square inches—was too great, and that the cause assigned by the coronor's jury for the explosion—over pressure of steam—is the correct one.

We cannot but suggest to the builders of these upright tubular boilers the insertion of a less number of tubes, giving more water space. It must be difficult to keep a sufficient quantity of water in a boiler built as this one was; probably but for the jarring and shaking of these machines while working, the flue plate and sheets surrounding the fire box would sometimes be bare.

VISCERA AND VITALITY VS. STEEL, CORD, AND WHALEBONE.

The devotees of fashion are no less abject in their worship at her shrine, no less willing to throw aside all considerations of reason, and to obey blindly her dictates, than the veriest slaves of heathen superstition are to sacrifice everything to the "gods which their own hands have made." We are struck with horror when we read of people prostrating themselves beneath the wheels of the car of Juggernaut, or of mothers throwing their children into the mouths of crocodiles, but such acts are tender mercies compared to practices in vogue at the present day among those who claim the highest degree of civilization as yet attained in the history of the world. How much better to die suddenly, all sense of pain being instantaneously crushed out of the body by brute force, than to suffer the prolonged misery of slow suffocation in croup, or the agonies of death by consumption.

The votaries of fashion do not scruple to impose these diseases upon themselves and their children, and although they refuse to believe it, and sin through ignorance, it is willful ignorance, and therefore all the more culpable. Parents who permit young children to go with bare necks, and almost bare legs, in the changeable climate of this latitude, are as heartlessly cruel as the heathen mother who immolates her child; and although the result is not so certain in regard to any particular victim, yet we believe that more children are thus annually sacrificed upon the altar of fashion, in proportion to our population, than are destroyed in the superstitious rites of people who are less culpable, because their ignorance is not the result of obstinate refusal to accept truth and obey its precepts. Not content with subjecting their offspring to the risks of exposure in early childhood above alluded to, fashionable mothers have revived the murderous practice of tight lacing. More than this, public journals have opened their columns to its defence, and books are beginning to make their appearance justifying it, and strongly asserting that it is essential to the attainment of both beauty and health.

It is of no use whatever to reassert facts which are patent to every physician, and which, if listened to, would speedily condemn the wearing of corsets to immediate and total extinction. People will not listen, and, to use the words of an English cotemporary, "so long as 'society' is ruled by women of fifty, who want to conceal the obesity which refutes their pretensions to thirty-five," there will be no lack of champions to defend, and examples to encourage the young to adopt the pernicious practice.

Neither is it of use to yield to the temptation which any sensible man must feel, no matter how little given he may be to profanity, to substitute u for the o, and insert an i before the t, in the word corset, whenever he hears the subject mentioned. To reason or to denounce is equally futile. The only way is to let Steel, Cord, and Whalebone "fight it out on this line," until Viscera and Vitality succumb. Let the "poor ghosts" of women now seen so frequently dragging themselves along through the streets, passionless, colorless (unless bedaubed), useless, listless, waistless, less every thing except pain, increase and multiply. Unfit for wives and mothers, they shall at last feel the weight of the disgust their unnatural practices excite; and as the number of old maids and consumptives increase, peradventure common sense may at last resume its sway.

SMALL PHILOSOPHERS.

The world is full of small philosophers, ready at a moment's notice to give you reasons "as plenty as blackberries" for anything whatever. They as a general thing believe that the changes of the moon have an important influence upon the weather, that if the new moon lies horizontally it is a "dry moon," and if it stands vertically it is a "wet moon." They will generally tell you that the moisture which gathers upon the outside of a pitcher of ice water in a warm day, is the "sweating" of the pitcher; and they believe that a wagon draws easier because the hindwheels are much larger than the others. They are men who believe implicitly in all the traditions of their fathers, and who carry with them through life the prejudices which they imbibe in their youth. Anything no matter how absurd it may be, provided it does not conflict with their preconceived opinions may be palmed off for truth; utterly innocent of logic, the form of a syllogism is sufficient to convince them, the truth of premises or the justness of an inference never being called in question so long as it leaves their prejudices undisturbed. They are fond of glittering generalities, and of high sounding assertions; and words, so long as they seem to mean something, are enough for them without sense.

Upon them charlatans thrive; and it is sufficient evidence that the mass of society is made up of just such people as we have described that so many imposters, in medicine and law, and in politics and religion, are enabled to fatten themselves upon it.

The tendency of mechanical study is to sweep away prejudice, to enlarge and liberalize views, and to induce men to subject to rigid and logical analysis, everything which demands belief. The vast interest which is now shown in mechanical science, is producing a set of hardheaded and determined thinkers, who are not likely to be deceived by such arts as have in past times, so to speak, led the world by the nose.

We see hope for the future in the developments of the present, and even in some of the vicious tendencies of the times we see agencies at work which will, we are confident, effect their own cure. Meanwhile let us all not only hope but labor for the speedy coming of the new era.

THE HAVRE EXHIBITION.

Punctually on the date first announced, the International Marine Exhibition, at Havre, France, was formally opened on the 1st ult., in the presence of the largest assemblage ever gathered in that city. So far as the display of goods was concerned, the exhibition, at last accounts, could not with propriety be called a success, the chaotic state which seems inseparable to the early records of all exhibitions, holding full sway. But if the first impressions were thereby rendered unfavorable, the committee seemed determined to make amends in the opening exercises, by rendering them of a character worthy of so important an event. The ceremonies consisted of the usual laudatory addresses, deemed indispensable on similar occasions, an ode on the history of navigation, and instrumental and vocal music, writen expressly for the occasion, and given by an orchestra and chorus numbering about five hundred performers.

The exhibition is of no mean size, the buildings and garden occupying a space of twelve and a half acres. The former consist of closed galleries one story in hight, having a more pretentious building at each corner of the square, formed by the galleries, for offices, etc. Inside the galleries, opening upon the gardens, is a covered promenade, monopolized by the representatives—either imported or improvised from native talent—of foreign nationalities, Jews, Turks, Arabs, and Hottentots, where they dispose of trinkets or refreshments, the latter being served in the style with which the representatives are supposed to be the most familiar. The garden boasts of a number of buildings of unique style of architecture. The leading attraction is probably the mammoth aquarium, situated in a grotto beneath what is designed to represent the Island of Fingal with its basaltic columns. The island is surrounded by a miniature sea, in which sport a variety of fishes and a small school of seals.

The number of exhibitors is about three thousand. The two groups of navigation and fishery occupy the front gallery of the building, the place of honor. Here are to be found the models and plans of vessels of every conceivable species and description, rigging for the same, fittings, stores, instruments and charts, systems of signals, boats and apparatus for saving life; also, the chief articles of exportation, the latter comprehending river and sea fishing, with all that appertains to both. These two groups include the goods of seventy-five per cent of all the exhibitors, a much larger proportion than was anticipated, so that nearly the whole of the gallery originally set aside for works of art has been taken for industrial purposes.

The United States is but sparsely represented in the exhibition, and the same may be said of Great Britain; but every thing sent is of first class character. As the exhibition develops we shall present further particulars of novelties displayed.

CHEMICAL NOMENCLATURE AND SYMBOLS.

The chemical nomenclature and symbols now in use were founded by the great Swedish chemist, Berzelius. His large work in six volumes is still a standard authority in chemical science, a remarkable fact when we take in consideration that it is nearly forty years old, and that it treats a modern science, not yet one century old, and which in late years has made enormous progress. Immense additions have been made to the total stock of our knowledge, but no change of any importance has been made in the principles laid down by the great Swede in regard to the facts stated by him, as far as inorganic chemistry is concerned. Organic chemistry was in Berzelius' time only in its infancy, and it required, in later time the genius of a Liebig to elevate this branch to the same level.

Berzelius considered it preferable to use for the chemical compounds the Latin names, as they would be the same for all nations. The idea, however, has not been carried out, but the chemical symbols which he founded on those Latin names have universally been adopted, and are now intelligible to all chemists, in all countries, no matter what language they speak, in the same way that numbers written in our Arabic numerals are equally well understood by the English, French, Germans, or others, and named by each in his own language. The reason is simply that the chemical symbols, like the numerals, do not represent the sounds of the names, but the substance, or objects themselves. They are not phonetic, but objective.

The first letter, or two letters of the Latin name which the elementary substances had at first received, have been adopted as the symbol representing not only the substance, but

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also a definite amount in weight of that substance; thus, O stands not only for oxygen, which is the most common substance in nature, but it also stands for 8 parts of oxygen; H stands not only for hydrogen (water generator), but also for 1 part of hydrogen; and the formula H O, therefore, means 1 part of hydrogen combined with 8 parts of oxygen, the most common compound existing, and known as ice, water, and steam, according to the amount of heat it contains.

When two or more substances have the same initials, another letter of the name is added to the less frequent one; in the same way as we indicate the different States of our American Union, Mo. for Missouri, and Miss. for Mississippi. Osmium, one of the rare noble metals, is indicated by Os, and Mercury, after the Latin name Hydrargyrum, by Hg. Both symbols standing respectively for 100 parts of the substance.

Ag.	stands for	Argentum (silver),	108 parts.
Al.	"	Aluminum (metal of alum),	14 parts.
As.	"	Arsenium (metal of arsenic),	75 parts.
Au.	"	Aurum (gold),	200 parts.
B.	"	Boron (similar to coal),	11 parts.
Ba.	"	Barium (similar to calcium),	68 parts.
Bi.	"	Bismuth (similar to tin),	208 parts.
Br.	"	Bromine (similar to chlorine),	80 parts.
C.	"	Carbon (coal),	6 parts.
Ca.	"	Calcium (metal of lime),	20 parts.
Cd.	"	Cadmium (similar to zinc),	56 parts.
Cl.	"	Chlorine (found in salt),	36 parts.
Co.	"	Cobalt (a hard, rare metal),	30 parts.
Cr.	"	Chromium (analogous to iron),	26 parts.
F.	"	Fluorine (analogous to oxygen),	19 parts.
Fe.	"	Ferrum (iron),	28 parts.
I.	"	Iodine (analogous to chlorine),	127 parts.
Ir.	"	Iridium (similar to platinum),	90 parts.
K.	"	Kalium (potassium),	39 parts.
Li.	"	Lithium (analogous to potassium),	7 parts.
Mg.	"	Magnesium (metal of magnesia),	13 parts.
Mn.	"	Manganese (very similar to iron),	27 parts.
Mo.	"	Molybdenum (similar to lead),	18 parts.
N.	"	Nitrogen (part of our atmosphere),	14 parts.
Ni.	"	Nickel (metal),	29 parts.
Na.	"	Natrium (sodium, found in salt),	23 parts.
P.	"	Phosphorus (found in bones),	31 parts.
Pb.	"	Plumbum lead),	104 parts.
Pd.	"	Palladium (similar to platinum),	53 parts.
Pt.	"	Platinum,	90 parts.
S.	"	Sulphur (brimstone),	16 parts.
Sb.	"	Stibium (antimony),	119 parts.
Se.	"	Selenium (similar to sulphur),	40 parts.
Si.	"	Silicon (found in silex, flint, etc.),	22 parts.
Sn.	"	Stannum (tin),	59 parts.
Sr.	"	Strontium (similar to calcium),	44 parts.

The above numbers represent the quantities in weight by which the different substances will mutually combine. As, for instance, 27 parts of iron will combine with exactly 16 parts of sulphur, and the symbol Fe. S., expresses not only the compound of iron with sulphur, but also the above proportion of quantities. These numbers are called atomic weights or chemical equivalents.

Besides these forty elementary substances, there exist some thirty others, which, being very rare, are omitted here. The whole crust of our globe is made up of different combinations of these seventy elementary substances, of which, however, only fourteen or fifteen constitute the chief mass of the mineral and of the organic world. In regard to the last, the different products of the earth's crust, vegetable and animal, they are chiefly made up of only three or four of these substances, with the incidental combination of the remaining ten.

THE WEST SIDE ELEVATED RAILWAY.

On Friday last the members of the city press were invited to inspect the working of the new elevated railway on Greenwich street. As has been before noted in our columns, the section now completed, running between the Battery and Greenwich street, was built as an experiment, to test the practicability of the plan. On Thursday, the Legislative Commissioners and Governor Fenton examined the railway, and expressed their entire approval of its mode of working.

The road is about one half mile in length, is fourteen feet in the clear above street level, and is supported by cast-iron pillars placed from twenty to forty feet apart. An endless wire cable of three quarters inch diameter, carrying with it a series of small trucks every fifty yards, is put in motion by steam power below ground, midway between the extreme stations. Motion is imparted to the car on bringing a projecting lip below the car floor in contact with the swiftly moving trucks, but by means of a series of leafed elliptic springs, having india-rubber buffers between each, there is far less shock at starting than is experienced in ordinary horse-cars, being hardly perceptible. The car can be stopped at any time by releasing the truck and applying the brake. The rails are of the ordinary pattern used on steam roads, and their wheels flanged so that no apprehension need be felt of the cars leaving the track. To make assurance doubly sure, each end of the car is provided with an extra axle and guide wheels with safety flanges. The speed attained on Friday was from ten to fifteen miles per hour. The projectors propose making the wire-cable larger, so that the rate can be considerably increased; other minor alterations and improvements, which the trials have suggested, will also be introduced.

Our city sadly needs increased traveling facilities within its limits. No more surface roads can be accommodated in our streets, and such as now exist are open to serious objections from which both the elevated and underground railways are free. Steam power can be safely applied on these, and increased speed be attained, a great consideration for those journeying morning and night from one end of the island to the other; besides, there is little liability on either road of travel being incommoded or stopped by track obstructions. The friends of the underground road are organized, and tunneling operations will soon begin, and with this section of elevated road actually in successful operation, the prospect surely brightens for a speedy improvement in city traveling accommodations.

Experiments with Dynamite.

Dynamite, the new explosive agent, manufactured by Mr. Alfred Nobel, of Hamburg, consists of porous silica, saturated with nitro glycerin to the extent of about 76 per cent, the compound forming a powder of reddish yellow color. It is, in fact, nitro glycerin, rendered safe to handle, without any diminution of its prodigious explosive force. As shown in the course of recent experiments, it is as safe as gunpowder against explosion by concussion. Nor does it, under ordinary circumstances, explode on the application of fire, but burns away quite quietly, leaving behind a whitish ash. To produce explosion by fire, the powder must be inclosed in a bore or vessel, perfectly air-tight. The portion brought in contact with the flame will simply burn, but when the gases produced by such combustion have accumulated to a certain pressure the remainder will explode. In actual practice the explosive pressure is supplied by a sort of percussion cap placed in contact with the powder, and connected with an ordinary gunpowder fuze. The force exerted by exploding dynamite is said to be about three times greater than that of gun cotton, or some twelve times greater than that of gunpowder. Whatever the exact proportion may be, the power of the new agent is unquestionably tremendous. A couple of tablespoonfuls laid quite loose on a thick beam proved sufficient, when fired, to break the timber right across, and project one of the fragments to a considerable distance. A charge of six pounds, exploded in a horizontal bore, brought down about 4000 cubic feet of whinstone rock. Four pounds, fired in a tough rock, produced results which, it is averred, could not have been obtained by any possible charge of gunpowder. In another experiment four tenths of a pound of dynamite were placed in a small bore in the center of a mass of malleable iron, measuring twelve inches by ten. The charge was not plugged in; but even without that advantage, the explosion sufficed to shiver the iron into half a dozen pieces. Still more remarkable was the force exerted in a subsequent trial. A block of wrought iron, measuring nine inches by eight, was placed vertically in the ground, and a quantity of dynamite, covered only with loose rubbish, exploded on its upper surface. The result was to convert what had been a convex surface into a concave one, the mass of iron being at the same time split in several places. A five-ounce cartridge laid on the top of a huge block of whinstone, and covered with a little clay, served, by its explosion, to shiver the block into workable pieces. In addition to the blasting experiments, trial was made of the powder as a means of signaling at sea. For this purpose it seemed highly recommendable—a one-lb. cartridge, suspended by a cord, producing a report like that of a 32-pounder cannon.

OFFICIAL REPORT OF

PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING JUNE 30, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
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In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ *Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.*

79,293.—MACHINE FOR CLIPPING HORSES' HAIR.—Patrick Adie, of the Strand, England.

I claim the combination of the toothed plate, A and B, screws, I and I, handle, A H, with handle or lever, L K D H, the whole constructed and operated in the manner and for the purpose above set forth and described.

79,294.—HOT AIR FURNACE.—James Albee (assignor to Moses Pond and Company), Boston, Mass.

I claim the arrangement and combination of the flue, N, with either or both the pipes, M, the fire pot, A, the drum, F, the conduit, f, the escape pipe O, or its branch pipe, h', provided with a damper as described, the case, I, being furnished with a throat or opening for the passage of the evaporating pan, P, to and from the top of the flue, N, as set forth.

Also, the arrangement and combination of the deflector, H, with the case, I, the fire pot, A, the drum, F, the series of pipes, G, and their extensions, G', arranged with the drum and the fire pot, as specified.

Also, the combination of the damper, or the partition, n, having a hole, o, as described, with the two pipes, M M, and the flue, N, arranged with the fire pot, the drum, and the case, and combined with the conduit, f, and the escape pipe, O, as set forth.

Also, the arrangement of the evaporating pan and its throat with the flue, N, and the fire pot.

79,295.—KEYBOARD FOR PIANOS, ETC.—J. S. Allen and A. P. Wilkins, Allen's Grove, Wis.

We claim a keyboard to a pianoforte or other musical instrument, to which additional keys, whether one or more series, are employed or arranged for operation upon the ordinary keys of the keyboard, substantially as and for the purpose described

79,296.—TREADLE FOR SEWING MACHINES.—A. Q. Allis, Dayton, Ohio.

I claim the arrangement upon the frame, A, of the spring, F, on shaft b, the ratchet wheel, c, pawl, d, and gear wheels, e g e1 g1 e2 g2, driving shaft, B, pulley, E, fly wheel, D, friction pulley, h', brake, h, rod, k, spring, m, treadle, n, and rack, p, as herein described, for the purpose specified.

79,297.—SPINNING MACHINERY.—Robert Atherton and Geo. Singleton, Paterson, N. J. Antedated June 19, 1868.

We claim in silk spinning machinery the combination of the stationary pin B, stationary thimble cap, K, and thread guide traveler, W, with the movable tube, E, and bobbin, H, constructed and arranged substantially in the manner described and for the purpose set forth.

79,298.—MANUFACTURING GLASS WARE WITH HANDLES.—J. S. Atterbury and T. B. Atterbury, Pittsburg, Pa.

We claim a glass lamp, or other article in glass, having a molded or cast handle and a blown body, produced substantially as described.

79,299.—WHIP.—Dexter Avery, Westfield, Mass.

I claim as a new article of manufacture, a whip having its covering woven with a weft and warp, as herein described for the purpose specified.

79,300.—HARVESTER.—Darius Babcock, Warsaw, Ill.

I claim 1st, The dome-shaped frame, A', in combination with the dome, A, and in combination with any mowing and reaping machinery, substantially as shown and described and for the purposes set forth.

2d, The annular frame, F, in combination with the frame, A', and the axle, M, substantially as shown and described, and for the purposes set forth.

3d, The combination of the axle, M, gear wheel D pinion, C, shaft, B, crown wheel, a, pinion, E, and shaft, H, with the frame, P, all constructed arranged, and operating substantially as and for the purposes set forth.

4th, The frame, f, in combination with the lever, L', and chain, and arm, i, substantially as shown and described and for the purposes set forth.

5th, The hook, g, in combination with the arm, i, and any flexible bar, R, substantially as shown and described, and for the purposes set forth.

79,301.—BROADCAST SOWER.—Alfred B. Beaumont, Grand Rapids, Mich.

I claim, 1st, The adjustable disks, k" k'", for regulating the discharge of the grain, substantially as and for the purpose shown and described.

2d, The stop, s'", in combination with the disk, k'", substantially as and for the purpose shown and described.

3d, Arm, m", substantially as and for the punoses shown and described.

4th, Arm, m'", substantially as and for the purposes shown and described.

5th, The slot, v, on the arm, m'", substantially as and for the purposes shown and described.

6th, The spring, v', on the arm, m'", substantially as and for the purposes shown and described.

7th, Operating the disk, k", by means of a rod, M, spring, S', lever, P, and hook, t, or other equivalent devices, substantially as and for the purposes shown and described.

8th, The guiding cone, K, substantially as and for the purposes hereinbefore shown and described.

9th, The arms, m and n, of the cone and hopper, substantially as and for the purposes shown and described.

10th, Constructing a scattering wheel, i, with a central opening, k, and channels, o, whereby the grain can pass into a portion of its said channels, substantially as and for the purposes specified and shown.

11th, The cylindrical slides p, of the disk, k", for the purpose of retaining the latter in the throat of the hopper, whereby the said disk is permitted to partially rotate, substantially as and for the purposes hereinbefore described.

12th, The bevel wheel, F, on the axle, x, and connected with an independent ratchet disk, f, substantially as and for the purposes hereinbefore shown and described.

13th, The hollow pulley, H, with its bevel wheel, G, within it, in combination with a grain sowing machine, substantially as and for the purpose shown and described.

14th, The coupling devices, f'" b', in combination with a grain-growing machine, substantially as and for the objects shown and described.

15th, The disk, k', attached to the cone, K, and provided with openings for dropping the grain or plaster, substantially as and for the purpose shown and described.

79,302.—BED SPRING.—Henry Beyrodt, Louisville, Ky.

I claim the combination and arrangement of the outer cylinder, No. 3, the spiral spring and its covering, No. 4, and the presser, No. 6, constructed and operated in the manner as shown and described and for the purposes set forth.

79,303.—GILDING AND ORNAMENTING GLASS SIGNS.—J. B. Blair, Philadelphia, Pa.

I claim the production of duplicates in plain or ornamental gilding or painting, substantially as and for the purposes set forth.

79,304.—CULTIVATOR.—A. R. Blood, A. Hathaway, and V. R. Beach, Independence, Iowa.

We claim, The levers, J J, strips, a a, bar, L, and pivoted frame, I, when all are arranged and operating substantially in the manner and for the purpose set forth.

2d, The set screw, H, seed slide, b', levers, J J, strips, a a, bar, L H, pivoted frame, I, all combined and arranged as and for the purpose described.

79,305.—CRUTCH.—A. E. Bowen, Baltimore, Md.

I claim, 1st, An adjustable crutch, constructed in the manner and for the purpose herein set forth.

2d, The combination of the legs, A A and B B, the thumb-screws, i i, the elastic top or arm-rest, and the elastic bottom of the crutch.

79,306.—WRENCH.—Wm. Bradshaw and Charles Lyon, Delphi, Ind.

We claim the open-backed jaw, E, in combination with the links, b, and shanks, C, substantially as described for the purpose specified.

79,307.—NAIL EXTRACTOR.—J. D. Breathitt, Cooper county, Mo.

I claim the fulcrum, B, of the nail extractor, A, when pointed at its lower end, and adapted to be adjusted longitudinally of the extractor, A, to increase or decrease the leverage of the latter, as herein described for the purpore specified.

79,308.—DOOR BELL.—Asa T. Brooks, New Britain, Conn.

I claim, 1st, An oscillating arm, k', and vibratory cam, u, secured and oscillating both upon the same stud pin, n, in combination with the arms, d k, substantially as described.

2d, In combination with the above, the anglelever, v, oscillating upon the pin, v,' all arranged and operating substantially as and for the purpose described.

79,309.—RAILROAD RAIL.—R. M. Brooks, Griffin, Ga.

I claim the combination of the railroad rails, A and B, provided with corrugated flanges, a a and b b, and fitting together, substantially as and for the purpose set forth.

79,310.—WASH BOILER.—Stephen Buynitzky, St. Petersburg, Russia.

I claim a loose plate, C, provided with the guides, E, or their equivalents, substantially as described, to be placed on the top of the clothes in the wash boiler, for the purposes set forth.

79,311.—WAGON BODY.—Matthew M. Carr (assignor to himself and Thomas S. Carr), Ringwood, Ill.

I claim the combination of the hinged sections of the bottom, C D E, the bars, F, pivoted as described at H, the springs, J, latches, I, levers, K, cords or chains, G and N, and levers, L and M, all arranged and operating in the manner set forth.

79,312.—STOVE GRATE.—Gardner Chilson, Boston, Mass.

I claim the square or rectangular grate, as arched or curved both longitudinally and laterally, and having its side bars trussed or made deeper at their middles than at their ends, as represented.

Also, the combination and arrangement of the elbow of the grate arm, with such arm and the grate, constructed and disposed relatively to each other, substantially as specified.

79,313.—APPARATUS AND PROCESS FOR MAKING STEEL.—T. J. Chubb, Williamsburg, N. Y. Antedated Dec. 30, 1867

I claim, 1st, The construction of a series of deoxidizing and carbonizing retorts or chambers, A A A, arranged so as to prevent the gases from the heat-producing fuel from coming in contact with the ore or the materials in the retort, in combination with a melting chamber for the purposes set forth.

2d, The arrangement of the melting chamber, B B', with openings and doors at both ends, in such a manner as to facilitate the manipulation of the ore or metal, under treatment from both ends, substantially as described.

3d, Making provision for feeding loose ore and metallic and other substances in at one end of the melting chamber or furnace, B', and tapping the molten metal at the other end, substantially as described.

4th, Making provision for conducting heated air and gases over the ore or molten metal, said air and gases entering at one side or end of the said melting chamber or furnace, and passing out at the sides or other end therefor, for the purpose of reducing said ore, metal, or metallic substances therein into a liquid or molten mass, substantially as described.

5th, Making provision for shielding the ore, metal, and other substances from the direct action of the gases of the fuel, by arches T.

6th, Making provision for shielding and protecting the molten metal in a melting chamber from the direct action of the air, flame, and gases of the fuel, by floating shields, or an equivalent refractory substance or substances floating on the top of the metal, as described.

7th, Making provision for skimming off the surface of molten metal by floating scrapers, or their equivalents, substantially as described.

8th, Effecting a separation of the cinder or upper layer of substances floating on molten metal by the means herein specified and described.

9th, The construction of a vessel or melting chamber of a furnace, so arranged that it may be heated solely from above, by which means the metal therein becomes fully melted into a liquid state previous to skimming, tapping, and drawing off the same, substantially as herein described.

10th, Making provisions for and effecting the melting of metals by heat applied solely from above the metal, when said heat is derived from a gas regenerative apparatus or furnace.

11th, The arrangement of a furnace or of a vessel or vessels in a furnace for melting metals therein, in combination with and heated by the flame produced by the mingling together of the air and gas rising from and having passed through an air heating and gas heating or reheating furnace, chamber, or apparatus, in separate currents.

12th, Providing for keeping the under side of the melting chamber, or chambers in which the melting chamber or vessel is placed, cool, or from melting or leaking, by the arrangement of a cold air chamber or space below the same, C.

13th, The employment of slats or arch pieces, T T, for the purposes set forth.

14th, The employment of scrapers or skimmers, S S, or their equivalent, for the purpose set forth.

15th, The employment of floating fire shields and heat conductors, S S, or their equivalents, for the purpose set forth.

16th, Constructing slabs, arches, and shields with an uneven or irregular surface on one or both sides thereof, for the purpose set forth.

17th, The method or process of refining metals, and separating the dross and other extraneous matter from the surface of melted metal by mechanical power and appliances, or of inserting of refractive or infusible colder suostances than the dross and scum, cooling and congealing them that they may be skimmed or removed from off the surface of the molten metal, substantially as set forth.

18th, Making provisions in the construction of a melting chamber of a furnace for reducing iron into such a liquid state by igneous fusion that highly carbonized iron ore, or pig iron, cast or steel, and natured iron ore, or wrought iron, may fuse and mix with each other, and the impurities and surplus carbon, silicon, and other matter that is not essential to the production of good cast steel, may be flooded and removed from the surface of the melted steel, refining and running the same into vessels or molds, substantially as described.

19th, Obtaining cast steel, or products of any degree of malleability or ductility, by melting together in a vessel or chamber in a furnace, combinations of pig iron and wrought iron, or of natured or partly natured iron and cast iron, and fusing, mixing, refining, and running the same into molds, substantially as described.

20th, The production of cast steel by mixing together, in a fixed or stationary melting vessel, chamber, or furnace, cast iron and iron ore, when such iron has been previously reduced, or natured, or partly natured, or carbonized in a separate vessel, retort, or furnace, and when mixed with manganese or titanium, or the ores or compounds thereof, and fusing, mixing, and running the same into molds.

21st, The production of cast steel by first melting the iron or metal containing the most carbon in a stationary vessel, and adding the metal or ore containing the least carbon to the molten metal, and when the whole is reduced to the proper consistency of cast steel, running the same into molds.

22d, Effecting a continuous process or reducing or melting and refining ores and metals by mechanical appliances, and at one heating, and in one furnace chamber substantially as described.

23d, Effecting a continuous process of making cast steel from iron ore by submerging it into a bath of molten cast iron or highly carbonized iron, whereby the whole will be liquified and brought to the consistency of cast steel and refined and run into molds.

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79,314.—MAKING STEEL DIRECT FROM THE ORE.—Thomas J. Chubb, Williamsburg, N. Y. Antedated Jan. 15, 1868.

I claim, 1st, The arrangement and employment of fuel supporters, a a, and d d' a for the purpose set forth.

2d, The arrangement and employment of stirrers and conveyers, b b b, for the purpose set forth.

2d, The process of decomposing mineral substances by currents of heated gas or gases passing through and among finely divided particles of the same, substantially as described and herein shown and for the purpose set forth.

4th, The carbonization of iron or iron sponge, or the metallic particles therein by a current or currents of heated gas or gases, as herein described, passing through and among finely divided particles of the same, substantially as described.

5th, The steel melting chamber, C, in combination with a heat-reclaiming apparatus, or a gas-regenerative, or air and gas heating apparatus or furnace.

6th, The process of making cast steel, in combination with a heat reclaiming and regenerative apparatus or furnace.

7th, The employment of aluminous substances, such as fire clay crucibles, as a substitute for plumbago crucibles, for making or melting steel therein, in combination with a gas generative furnace and a heat reclaiming apparatus.

8th, The employment of a stationary melting chamber, vessel or furnace in combination with the appurtenances employed in the process of decomposing or deoxidizing iron ore, and carbonizing the metallic particles thereof.

9th, The employment of a stationary melting chamber, vessel, or furnace, in combination with the process or processes of decomposing or deoxidizing iron ore, and carbonizing the metallic particles thereof.

10th, The process herein described of decomposing or deoxidizing iron ore and carbonizing the metallic particles thereof.

11th, The process herein described of making cast steel direct from the ore.

12th, The employment of coal tar, rosin, petroleum oil, or the gas or gases thereof, for the purpose set forth.

13th, The employment, in the deoxidizing chamber, in combination with carbon, of ammonia, or some ammoniacal compound, or of fusible compounds of cyanogen, or the gas or gases therefrom, to facilitate the conversion of iron ore, or iron or steel spunges, into molten or cast steel, substantially as described.

14th, The employment of the chamber, A A', in the manner described, and the appurtenances and process employed therewith, for the purpose set forth.

15th, deoxidizing and carbonizing iron ores in a chamber separate from and previous to melting the same in a cupola or a blast furnace, substantially as described.

16th, The combination of the process or processes of deoxidizing and carbonizing iron ores with the process of reducing and melting the metallic particles thereof, in a cupola or a blast furnace.

17th, The arrangement of a melting or remelting and refining chamber, as described, in combination with a cupola or a blast furnace, (figs. 3 and 4).

18th, The combination of the process of reducing iron ores, and melting the metallic particles thereof in a cupola or a blast furnace, with the process of melting or remelting and refining, substantially such as herein described.

19th, Producing refined iron or steel by the process of deoxidizing and carbonizing the ore in a separate chamber, and melting the metallic particles thereof in a cupola or a blast furnace, substantially as described and shown, (figs. 4 and 6).

20th, Producing refined iron or steel by the process of reducing the ore, and melting the metallic particles thereof in a cupola or a blast furnace, and reheating and refining the same in a melting or remelting and refining chamber, substantially such as is herein described.

21st, The arrangement or employment of an air heating and gas heating or reheating apparatus, in combination with a cupola or blast furnace, for the purpose set forth.

22d, The arrangement or employment of an air heating and a gas heating or reheating apparatus, in the process or processes of deoxidizing and carbonizing iron ore, substantially as described.

23d, The employment of the chamber, C, in the manner described, and the appurtenances and process employed therewith, for the purpose set forth.

79,315.—CAR STANDARD.—Robert Clarke, Mount Vernon, Ohio.

I claim the box, A, provided with the side supports, G G, and confined to the car by means of the stirrup, B, and the pin, E, when used in combination with the standard, D, which is provided with a slot, a, through which the pin E, passes, as and for the purpose set forth.

79,316.—IMPLEMENT FOR SHARPENING THE CALKS OF HORSE SHOES.—Henry M. Close, Chariton, Iowa.

I claim, 1st, The jaw, D, with the block, E, and the upright, F, substantially as specified.

2d, The combination of the cutter, H, block or rest, E, and set screw, G, substantially as and for the purpose described.

79,317.—COW MILKING MACHINE.—L. O. Colvin, New York city.

I claim, 1st, A pump cylinder, for actuating a cow milking apparatus, having a variable osculating movement imparted to it, substantially as and for the purpose described.

2d, The combination, with a pump having a variable oscillating movement, substantially as and for the purpose described, of the tubes, E and E1, for supporting the milker, and communicating the various motions to the same, as herein described and for the purpose set forth.

3d, The combination of the tubes, E and E1, of the caps, d and d3, bracket d1, set saw, d4, and pin nut, when constructed and arranged substantially as and for the purpose described.

4th, The combination, with a pump piston rod, of the bent arm, c, pivoted to the end of a bent hand lever, D, and oscillating joint, a, substantially as and for the purpose described.

5th, The stall, constructed as described, in combination with the cow milking device, as herein set forth and for the purpose specified.

6th, The combination, with the oscillating cylinder, A, of the pipe, E, when jointed to the same in the manner described, as and for the purpose described.

7th, A pump cylinder for the cow milking apparatus, to which the same is connected, as described, provided with a swivel joint, d, whereby the cylinder may be susceptible of oscillation on its oxis, substantially as and for the purpose described.

79,318.—WATER CLOSET AUTOMATIC SUPPLY REGULATOR.—George Conron, New York city.

I claim the combination and arrangement, with relation to the bowl, A, and discharge bowl, B L, of the chambers, E C h, valve, G, float, D, lever, a, rod, b c, valve, d, and box, I, having the shoulder, j, and openings, e f, adapted to communicate with the supply pipes, J K, substantially as herein shown and described, for the purpose specified.

79,319.—HORSE SHOE CALK SHARPENER.—Richard Crocker, Marshalltown, Iowa

I claim the device consisting of the lever, B, provided with the cutting edge, a, the lever, D, provided with the abutment, c, and face, b, said lever, B, with cutting edge, a, lever, D, with abutment, c, and face, b, being combined, operating as described, and for the purpose set forth.

79,320.—SAD IRON HANDLE.—S. H. Cummings, Norway, Me.

I claim, as a new article of manufacture, the handle, B, formed of a single piece of wire, which is bent and coiled to form vertical columns, the horizontal central portion being left plain, for the application of the part, C, said handle being also provided with the shield, D, all as herein shown and described for the purpose set forth.

79,321.—METALLIC REED FOR MUSICAL INSTRUMENTS.—C. N. Cutter (assignor to Davis, Hill & Co.), Worcester, Mass.

I claim a metalic reed for musical instruments, in which the tongue of the reed and frame, or part to which the same is attached, are combined with an interposed rubber or other elastic packing, substantially as and for the purposes shown and set forth.

79,322.—METALIC REED FOR MUSICAL INSTRUMENTS.—C. N. Cutter (assignor to Davis, Hill, and Co.), Worcester, Mass.

I claim, 1st, The combination, with the base, a, of the tongue, B, and the main or frame part, A, of a holding staple, clasp, or loop, substantially as and for the purposes set forth.

3d, The combination, with the tongue, B, and frame or base, A, of the clasp C, having projections, b b, and shoulders, d d, substantially as and for the purposes set forth.

79,323.—COMPOUND LENSES FOR PHOTOGRAPHIC USE.—John Henry Dallmeyer, Middlesex county, England. Patented in England, September 27th, 1866.

I claim the double combination lens, composed of two positive achromatic or actinic combinations, each having the higher refracting denser material at the exterior.

2d, Also, the construction of the double combination lens, with the denser higher refracting material at the exterior, and with the posterior achromatic combination of smaller diameter than the anterior combination.

79,324.—LETTER POUCH.—P. Davis, Newport News, Va.

I claim a letter pouch, having its exterior lined or ruled off, with addresses printed or written thereon, substantially as shown and described.

79,325.—CAR REPLACER.—Rees Davis, Utica, N. Y.

I claim a railroad car replacer, constructed of wood and iron, with the frogs of different lengths, arranged and adapted to the rails, substantially as described, and for the uses and purposes mentioned.

79,326.—LUBRICATOR FOR NAIL MACHINES.—Lucius A. Dodge, Keeseville, N. Y.

I claim the stock, A, provided with the chamber, C, the wick-chambers, C' and C', passages, d d, and the set screws, a a, substantially as and for the purpose described.

79,327.—HAY LOADER.—N. B. Douglas, Cornwall, Vt.

I claim, 1st, The removable frame, G, attached to a frame, F, hung on the rear axle of the wagon, in combination with the toothed bells, o, and the discharger, A x, all arranged to operate in the manner substantially as and for the purpose set forth.

3d, The rake head, s, hung to the frame, G, in such a manner that by freeing the springs, u, upon the head, from the stops, w, upon the frame, the rake, J, can be turned up and rendered inoperative, as herein shown and described.

79,328.—HORSE HAY FORK.—James Drinkwater, Adams, Ohio.

I claim the combination of the handle, G, latch, H, spring, I, notch, L, and trigger, K, with the hay fork, as herein described, for operating substantially as set forth

79,329.—SKATE.—Stafford A. Du Bois, Chicago, Ill.

I claim, 1st, A skate, made in two separate and distinct parts, one to be attached to the heel of the boot, and one to the sole thereof, substantially as herein set forth.

2d, In combination with the plates, H and F, of the skate, the flanges, M and I, and the thumb screws, L, when constructed and operating substantially as described.

79,330.—RELAY MAGNET.—Charles Durant (assignor to Geo. F. Durant), Jersey City, N. J.

I claim, 1st, The application of a spring or springs, a cushion or cushions, or other elastic substance, to the electro magnetic relay machine, substantially as and for the purpose herein shown and described.

2d, The shield or protector, S, for the conducting wire, I, substantially as and for the purpose herein shown and described.

79,331.—RELAY MAGNET.—Charles Durant (assignor to Geo. F. Durant), Jersey City, N. J.

I claim, 1st, The jaws or fork in the armature or armature lever, of an electro magnetic relay machine, substantially as and for the purpose herein shown and described.

2d, The jaws or fork in the post, B, substantially as and for the purpose herein shown and described.

3d, The weight, T, applied substantially as and for the purpose herein shown and described.

79,332.—BROADCAST SEEDER AND CULTIVATOR.—George Easterly, Whitewater, Wis.

I claim, 1st, The construction of the cap, F, with an upwardly flaring throat d, with a hollow projection, d2, for receiving a packing, i, and also with a discharge passage, f1, substantially as described

2d, The construction of the bearing, G, with discharge openings, h, and f2, through its bottom, and with a recess on one side of it, over opening, h, for receiving the circular flange, S, said bearing being applied to the cap, F and adapted to serve, in conjunction therewith, as a receptacle for the rotary distributer, J, and cylindrical cut-off, J', substantially as described.

3d, The flange, S, with segmental projections, S' in combination with the distributer, J, and cut-off, J', arranged to operate substantially as and for the purpose described.

4th, Applying the distributer, J, and cut off, J', loosely upon its shaft, K, in combination with the cap, F, and bearing, G, substantially as described and for the purposes set forth.

5th, Constructing conical scatterers, I, for seed discharging tubes, with circular ribs or corrugations upon their surfaces, substantially as described.

6th, The combination of the driving wheel, N, pinion, K1, clutch, n n', and lever, P, with the device, K2 K3, for regulating the discharge of seed, substantially as described.

7th, The construction of the plate, E, with the lateral offset, c, serving as an end bearing for the rod, D2, for carrying drag bars, D, substantially as and for the purposes described.

8th, The adjustable clamp stops, pivoted to hoe standards, D1, when such stops are so constructed as to resist ordinary backward pressure against the hoes, and also to allow the standards to slip backward when subjected to an extraordinary pressure, substantially as described.

79,333.—PUMP FOR OIL WELLS.—Mandana D. Fenner, Rochester, N. Y.

I claim an apparatus for washing or producing an agitation in a well, consisting of a tube opening directly into the liquid of the well, and having a solid plunger, in combination with an elevating tube having a valvular piston, when the plunger and piston have an inequality of leverage, substantially as described.

79,334.—BRIDLE.—E. R. Ferry, New Haven, Conn.

I claim, 1st, The levers, f f, fitted loosely on or permanently attached the bar, e, of the bit, and having a curb strap or chain, j, attached to their upper ends, in connection with the reins D D, passing through the outer ends of the levers, i, and passing over pulleys, c, at the upper part of the bridle, and down to the bit, all arranged to operate in the manner substantially as and for the purpose set forth.

2d, The springs, E E, and stops, k, applied to the reins, D D, in connection with the levers, f i, and pulleys, c c, on the bridle, all arranged substantially as and for the purpose specified.

3d, The application of the pulleys, c, with or without the pulleys, h, in connection with the reins, D D, arranged substantially as and for the purpose set forth.

79,335.—ENAMELED METALLIC ICE PITCHER.—Charles C. Foote (assignor to Meriden Britannia Company), West Meriden, Conn.

I claim coating the inside of metallic ice pitchers with enamel, by applying the enamel in a liquid state to the metallic inner surfaces, substantially as herein shown and described.

79,336.—HOP PICKER.—Henry Fornecrook, F. J. Shepperd, and Andrew Garton, Watertown, Wis.

We claim, 1st, The manner of adjusting the incline of the bolt, F, by means of the movable strip, a2, in combination with the jack, g2, suspended to the frame by one screw upon each side, substantially as herein shown and described.

2d, The combination and arrangement of the picker, B, cleaner, D, bolt, F, shaker, H, and feed rollers, O O and P, in the manner and for the purpose substantially as herein set forth.

3d, In combination with the above, the elevator, M, arranged substantially as herein specified.

79,337.—COMPOSITION FOR KALSOMINING WALLS, ETC.—N.A. Frank, Chicago, Ill.

I claim a kalsomine composed of the ingredients herein named, and compounded substantially as specified.

79,338.—MACHINE FOR PRESSING HATS.—Wm. E. George, Wrentham, Mass

I claim the combination and arrangement of the socket piece, m, the head, G, the diaphragm, k, the elastic covering, l, and flanged ring, q, of the dye, the said socket piece, m, and flanged ring, v, being connected substantially as described.

And for use with the steam chest, C, when combined with a mold and die, and mechanism for forcing the die into the mold for the purpose of pressing a hat, the combination, substantially as described, for fastening a mold, B, to the mold of the steam chest, the same consisting of the flange, a, the annulus F, the clamp ring, E, the screws, g, the projections, e (of the flange, d), and notches, f, of the said ring, the whole being arranged in manner and to operate substantially as described.

The combination of the presser or elastic die with the head, G, by the tenons, s, their pins and holes, the same being so arranged as to enable the said presser or die to be readily removed from the head, G, without disturbing the connection of the diaphragm and the elastic covering of the presser.

79,339.—REGISTER FOR RAILROAD CARS.—P. S. Gerhart, Philadelphia, Pa.

I claim the combination of a turnstile with pending arms, with any car or other vehicle, the whole constructed, arranged, and operating in the manner as and for the purpose above set forth and described.

79,340.—MODE OF REPAIRING BARRELS.—Edmund W. Gillman, Hunter's Point, N. Y.

I claim the hoop, B, slotted to receive the adjustable gripes, C D, and provided with lugs adapted to be drawn together by means of the screw, E, substantially as and for the purpose set forth.

79,341.—LOCOMOTIVE STEAM ENGINE.—Anton Haeupel and John Reinhardt, Philadelphia, Pa. Antedated June 13, 1868.

We claim, 1st, A valve regulating wheel or disk, M, in combination with the shaft, D, having notches, d', movable collars, P Q, key, S, and bar, T, all arranged and operating substantially as herein set forth.

2d, The combination with the movable collars, P Q, of the releasing trigger, O, lever, N, and forks, n o, with their described connections, substantially as herein set forth.

5d, The slides, L D, friction rollers, L2 L2, and vibrating levers, K K, in combination with the wheel, M, for communicating motion to the valves, substantially as described.

79,342.—APPARATUS FOR HOPPING BEER.—Wm. S. Haight, Waterford, N. Y.

I claim, 1st, Arranging a rotary stirrer, F f, in a hopping apparatus, between two perforated shelves, D and E, substantially as herein shown and described.

2d, The arrangement in a beer hopping apparatus of the discharge pipe, H, and overflow pipe, L, both arranged substantially in the manner herein shown and described, the overflow pipe entering the discharge beyond the tap, g, in the latter, as set forth.

3d, A beer hopping apparatus consisting of the box, A, air tight cover, B, perforated false bottom, D, and perforated false cover, E, of the stirrer, F f, discharge pipe, H, overflow pipe, L, and aroma, conductor, J, all made and operating substantially as herein shown and described.

4th, Making the stirrer shaft, F, removable, by suspending one end upon the pin or arbor, c, of the driving crank or pulley, substantially as herein shown and described.

5th, The application of the plug, L, or its equivalent, through the real and false bottoms of the box, A, for the purpose of facilitating the discharge of the spent hops, as set forth.

79,343.—HOSE COUPLING.—Wm. Hamilton, Chicopee, Mass.

I claim the combination of the two parts of the coupling, each having a lip, B, and rim, A, with the fastening pin, D, with spiral slot, H, and eccentric face, J, the parts being constructed and arranged together substantially as herein given.

79,344.—CULTIVATOR.—Major E. Hanover and David D. Bailey, Lamoille, Ill.

We claim, 1st, The frame, C, constructed and arranged substantially as herein shown and described, in combination with the axle, B, as and for the purpose set forth.

2d, The combination and arrangement of the pivoted oblique beams, P, connecting bars, U, levers, V, and connecting rods, W, with each other and with the frame, C, and hounds, D, substantially as herein shown and described and for the purpose set forth.

3d, The combination and arrangement of the hounds, D, frame, C, lever hooks or catches, coiled or equivalent spring, F, and operating rod, G, with each other, substantially as herein shown and described and for the purpose set forth.

4th, The combination of the angular or bent brace bars, T, with the pivoted plow beam, P, axle, B, and frame, C, substantially as herein shown and described and for the purpose set forth.

5th, The bent levers, A', pivoted at their angle points to the axle, B, in combination with the connecting rod, B', in rear of the axle, B, draft rods, C', horizontal bar, E', hounds, D, and slotted vertical arms, D', all operating as described, for the purpose specified.

79,345.—PAPER SHEARS.—Alfred Hathaway, Charlestown, Mass.

I claim, 1st, The mechanism for securing the cutting action of the blade, E, by means of wrist pins acting in slots, F and G, shaped as set forth, and located in arms attached to the lever, D, substantially as described.

2d, shear blades when one or both are denticulated upon the edge, and they are united by self-adjusting fulcra, substantially in the manner and for the purpose set forth.

3d, The combination of the stationary block, B, and lever, D, with adjustable blocks, C C', and levers, d d, the latter being so connected with the lever D, by intermediate levers and rods, that they may be operated simultaneously with the latter by a single movement, substantially as and for the purpose set forth.

4th, The combination of the lever, D, and denticulated shearing blade, E, substantially as and for the purpose set forth.

79,346.—HAMMER.—Peter C. Havely and Wm. W. Coggshall, Rensselaerville, N. Y.

We claim the implement herein described, consisting of the hammer, B, adze, E, nail holder, a, claw, F, movable jaw, G, notched socket, C, graduated handle, A, and removable screwdriver, D, all constructed and arranged to operate in the manner as herein set forth.

79,347.—CLASP HOOK.—Daniel Hayes, Cambridge, Mass.

I claim the application to iron hooks of a clasp or bar, attached to said hook as aforesaid, and a spring attached to the outside of aforesaid hook, in the manner above set forth.

79,348.—COMBINED STOVEPIPE, OVEN, AND WATER HEATER. Harvey Herrick, Dixon, Ill.

I claim, 1st, Constructing a heater, C, without an inner wall, so that the oven or boiler forming the inner wall thereof may be exposed to the direct action of the heat in the flue, substantially in the manner and for the purposes herein specified and shown.

2d, In combination with a heater constructed substantially as described, an oven, D, arranged to operate as and for the purposes set forth.

3d, In combination with a heater constructed as described, a boiler, F, constructed so as to form the inner wall of the heater, substantially as and for the purposes specified.

79,349.—CHURN AND ICE CREAM FREEZER.—Charles Higley, Port Byron, N. Y.

I claim the receptacle, F, constructed as described, with double walls and bottom, forming a water or ice chamber, H, having no communication with the interior of the receptacle, and closed at the top by means of the annular flange, I, beneath which, within the receptacle, upon one side, the curved spout, L, is suspended, as herein described, for the purpose specified.

79,350.—DRESS PROTECTOR.—Theodore Himes, New Albany, Ind.

I claim the dress protector consisting of the drawers, D, leggins, E, double covering, A B, attached to the drawers, and skirt, I, all held up and suspended by straps from waistbands, f g, substantially as and for the purposes set forth.

79,351.—SHINGLE MACHINE.—Miller J. Hine, Equality, Ill.

I claim, 1st, The combination of the circular toothed wheel, F, pinion wheel, G, vertical shaft, H, ratchet wheel, P, pawl, O, arm, N, rock shaft, M, arm, L, connecting bar, K, and crank, wheel, J, with each other and with the carriage, D, and driving shaft, I, all constructed and arranged to operate substantially as herein shown and described and for the purpose set forth.

2d, The combination of the swiveled screw, B', and sliding bed plate, C', with the carriage, D, and block, A', substantially as herein shown and described and for the purpose set forth.

79,352.—MEDICAL COMPOUND.—A. J. Hobbs, Van Wirt, Ga.

I claim the medicinal compound substantially as above set forth.

79,353.—MATCH SAFE.—Alfred Hoyt, New York city.

I claim a match safe formed of the parts, A B and C, constructed, arranged and operating substantially as herein shown and described.

79,354.—FLOUR BOLT.—Jos. G. Humes, Gravios Mills, Mo.

I claim the construction and arrangement of the radial arms, b, affixed to the bosses, a, the adjustable screw bolts, B, and adjustable eye bolts, c, whereby the bolting cloth is strained radially and longitudinally, as herein described, for the purpose specified.

79,355.—LETTER BOX.—D. P. Jordan, Chicago, Ill.

I claim the letter box, C, in combination with the box, A, when constructed and operating substantially as shown and described, for the purposes set forth.

79,356.—CLEANING AND BORING DEVICE.—John B. Jordan Aurora, Wis.

I claim, 1st, An apparatus for boring and cleaning wells, consisting of the metallic cylinder, A, shaft, D, with auger lips, F, provided with flanges, F, and valves, c, constructed and arranged to operate substantially as herein described.

2d, In combination with the cylinder, A, shaft, D, with the auger lips, E, provided with flanges, F, and valves, c, the scraper, G, with its adjustable wings or curved arms, e, when constructed and arranged to operate substantially as herein described.

79,357.—BOOT-CRIMP.—F. L. Kathan and E. D. Rummer, Roscoe, Ill.

We claim the combination of the hinged crimp, A A A, block and screw, D, with the gripes, C C C, when arranged, constructed, and operating as herein described and for the purposes as set forth, as an article of manufacture.

79,358.—MAKING SOAP.—J. L. Klein, New York city.

I claim a new and improved process for making soap, as herein described, using for that purpose the aforesaid ingredients or compositions of matter, or any other substantially the same, and which will produce the intended effect.

79,359.—MACHINE FOR DRESSING MILLSTONES.—Azel Lane, Addison, N. Y.

I claim the combination with the platform, A, provided with the rack bars, B, of the shaft, C', provided with the sliding blocks C C, and pinions, F, substantially as and for the purpose set forth.

79,360.—MACHINE FOR ROLLING LEATHER.—Wm. H. Leach (assignor to Bradford Stetson) Uxbridge, Mass.

I claim 1st, The arrangement of the lever frame, C, provided with the projections, c, and the compound lever, C' D' F when the parts are constructed and made to operate the roller, B', as and for the purpose set forth.

2d, The flanges, d d, on the bearings, b, of the lever frame, C, as and for the purpose set forth.

79,361.—PIPE WRENCH.—R. H. Lecky, Allegheny City, Pa. Antedated June 13, 1868.

I claim a pipe wrench and cutter combined in one instrument, constructed arranged, and operating substantially as herein described, and for the purpose set forth.

79,362.—BRICK MACHINE.—W. O. Leslie, Philadelphia, Pa.

I claim 1st, The combination of the hopper having the inclined bottom, with the screw, E, located therein, with the spout F, and box, I, all constructed and arranged to operate substantially as shown and described.

2d, In combination with the box, I, the plunger, E, and shaft J, having the cam, K, and wheel, P, mounted thereon, for rotating the mold wheel continuously, and operating the plunger intermittently, substantially as herein described.

79,363.—SPIRIT LEVEL.—Homer Lewis, Bennington, Vt.

I claim 1st, Making a level-vial adjustable in its block by securing one end of the box, C, in which tha vial is held, to a spring, D, and the other end, by means of a screw, b, to a plate, E, or its equivalent substantially as herein shown and described

2d, An adjustable pump vial F, when secured in a box, G, which is by means of screws c c connected with a plate, H, or its equivalent, all being arranged within a slot, cut tarough the block, A, the ends of the slot being covered by means of plates, d d, as set forth.

79,364.—MACHINE FOR FORMING EYES OF PICKAXES, ETC.—H. L. Lowman, New York city.

I claim the second set of dies and inside swage in combination with the first set of dies and inside swage, substantially as and for the purpose specified

Also, forming the second pair of dies with that part of the cavity towards the inside swage, with an outward bevel or curve, substantially as herein described, in combination with the inside swage, the forward end of which is wedged-shaped, and with a cutting edge, substantially as and for the purpose specified.

79,365.—CURD MILL.—Jas. Macadam, Little Ealls, N. Y.

I claim the combination and arrangement of the hopper provided with a grate of straight bars beneath, and the toothed cylinder turning in said hopper, and having its teeth to pass down between said bars, substantially as described, and for the purposes set forth.

79,366.—LATHING MACHINE.—O. C. Macklett, St. Paul, Minn.

I claim 1st, The combination of the frame, A, cross head or hook pins, B, short levers, C, and verticle bars D, with each other substantially as herein shown and described, and for the purpose set forth.

2d, The combination of the adjustable sliding blocks, F, and pivoted dogs, G, with each other, and with the top bar of the frame, A, substantially as herein shown and described, and for the purpose set forth.

3d, The combination of the frame, H, and adjustable sliding gage, I, with the frame, A, substantially as herein shown and described, and for the purpose set forth.

79,367.—WASH-BOARD.—R. M. Mansur, Augusta, Me.

I claim the combination, with the washboard, B, constructed as described, of the pivoted props, I, the projections, O, and cam, H, arranged and adapted to operate as herein represented and described, and for the purpose specified.

79,368.—DEVICE FOR STOP MOTION FOR REVOLVING SHAFTS.—Eli J. Manville (assignor to Blake & Johnson) Waterbury, Conn.

I claim 1st, The key, d, sliding across the shaft to be moved, to couple or uncouple the same with the motor, substantially as set forth, in combination with a latch-stop, moved laterally, substantially as specified, to operate upon said key and stop the revolution of the shaft, as set forth.

2d, The latch-stop, g, mounted upon a hollow axis, in combination with the cam lever, n, and key, d, substantially as and for the purpose set forth.

79,369.—LAMP BURNER.—Geo. A. Mason, Chelsea, Mass.

I claim 1st, The arrangement of a chimney sustaining spring intermediately between the deflector or cone, C, and the base, A, of the lamp top, substantially as and for the purpose set forth.

2d, In a burner having an elevated deflector, the guide piece, G, and socket, D, in combination with the base plate, A, and wick-tube, B, when said guide-piece and socket are constructed as and for the purpose herein specified.

79,370.—CUTLERY.—Samuel Mason (assignor to the Beaver Falls Cutlery Company), Beaver Falls, Pa.

I claim attaching each bolster piece to the tine of knives and other articles of cutlery by means of a pin or pins on the bolster piece, upset into the countersink of a pin hole in the tine, in the manner hereinbefore described, and for the purpose set forth.

79,271.—CUTLERY.—W. C. Mason, Beaver Falls, Pa.

I claim securing the scale to knives, forks, and other articles of cutlery by beveling and indenting the edges of the bolster pieces, and fitting the edges of the bolster pieces, and fitting the edges of the scale into such bevels and indentations, the bolsters being attached to the handles by rivets in the ordinary manner, substantially as described.

79,372.—HEDGE TRIMMER.—T C. Mathews, Yates City, Ill.

I claim 1st, The curved arm, d, to support finger bar and carry crank pinion substantially as shown, as and for the uses and purposes herein set forth.

2d, The sleeve, l, connected so as to support the finger bar, the stop, n, the mortise to admit the stop, the grooves in axles, b, and the levers, m and o, all arranged and in combination substantially as shown, as and for the uses and purposes herein set forth,

3d, The attachment straps, r r, fastened to finger bar and pivoted to arm, d near crank pinion.

4th, The arrangement of the crank connecting rods j and k, the sickles and bent finger bar, substantially as shown and described.

5th The construction of a finger bar, bent in or near the middle, at any desired angle, and carrying a short sickle bar in each end, substantially as shown.

6th, The arrangement and combination of two connecting or driving rods, j k, upon one crank, and now fully and particularly disclaiming every other part of this machine, other than those above specifically claimed.

79,373.—WHISKEY STILL.—J. G. Mattingly and B. F. Mattingly, Louisville, Ky.

We claim the water jacket, and the use of water around the boiler, in order to prevent the beer from burning or encrusting on the bottom of the boiler, when used for distilsing purposes, when arranged, constructed, and operating as set forth.

79,374.—SYMPATHETIC INK.—D. C. McNeil, Osceola, Md.

I claim an ink composed of the ingredients and in about the proportions substantially as herein named and described.

79,375.—STEAM ENGINE CUT-OFF.—Jas. McPherson, Brooklyn, N. Y.

I claim 1st, The arrangement and combination, with each other, of the rotating wheels F, (fitted around the tubes or loose axles, e,) and of the spin

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dles, j connected eccentrically with the axles, e, and also with the cut-off slides D and E, substantially as herein shown and described.

2d, The movable sleeve, I, of the governor, levers, i h, and rack, g, with the tubes or axles, e e, arranged substantially as herein shown and described whereby to vary the cut-off with the motion of the engine, as set forth,

3d, The construction and arrangement of the eccentric spindle, j, whereby to convert the rotary motion of the wheel, F, into the reciprocating motion of the cut-off, and which is adjustable in and by the axle, e, of the wheel, F, that turns loose in the wheel, as set forth.

79,376.—TINSMITHS' STAKE.—Edmund H. Meigs, East Berlin, assignor to Rays and Wilcox Company, Hartford, Conn.

I claim, as a new improved article of manufacture, a tinsmith's stake, constructed substantially as and for the purpose described.

79,377.—REVERSIBLE ORDNANCE.—John D. Murphy, Baltimore, Md.

I claim, as a gun, having two communicating bores, B C, of different calibers, arranged as represented and described, and adapted to be mutually employed as the charge and air chamber, by removable plugs or tompions, D E, substantially as set forth.

79,378.—HORSE RAKE.—C. E. Murray, Sugar Valley, Pa.

I claim 1st The rake, provided with two sets of teeth, R E', and hung at the rear end of the axle, A, as shown in combination with the ratchet, F, pawl, G, arm, I, on shaft, J, spring, h, and the rod, N, and slotted plate, M, all arranged to operate in the manner substantially as and for the purpose set forth.

2d, The resting of the front end of the foot board, K, on spiral springs, f, which rest on the thills, L L, substantially in the manner as and for the purpose set forth.

79,379.—CAR BRAKE.—David Myers, Chicago, Ill.

I claim 1st, The combined lever and pawl, V, and pawl and pawls, g and T, in combination with the drum, H, and spring, F, when constructed and operating substantially as set forth.

2d, The shafts, D and J and tumbling rod, o, when arranged and operating substantially as and for the purposes above described.

3d, The lever, P, and bevel wheel, I, in combination with the pawl, N, and ratchet wheel, L, when arranged and operating substantially as herein set forth and described.

4th, The bar, Z, in combination with the lever, P, provided with the pointed arm S, for the purpose of releasing the dog, T, when constructed and operated substantially as and for the purposes herein described and specified.

79,380—CAPSTAN FOR GRUBBING MACHINE.—B. B. Newell, Centreville, Mich.

I claim the construction of a capstan, combining the frame A, center plate, B, cross tie, C, shaft, D, sweep, E, cylinder, F, loosely sleeved upon the shaft, D, flange and groove, G, lever and clutch, H, ratchet clutch, I, ratchet teeth J, upon the top of the cylinder, F, when arranged, constructed, and operating substantially as herein described.

79,381.—TOOL REST FOR ENGINE LATHES.—Cyrus Newhall, Hinsdale N. H.

I claim 1st, The combination, substantially as set forth, of the slide plate, E, with the rocking block, F, rocking on a central hinge directly underneath and parallel with the slot in which the tool post traverses, for the purposes specified.

2d The combination substantially as set forth of the slide plate, E, and rocking block, with the adjusting screw, J, and its pivoted sockets, i i'.

3d, The combination as set forth, of the slide plate, E, the rocking block, the bearing, e, the hinge. e', the eye bolts, and the jam nuts, whereby the wear of the joints is compensated.

4th, The combination, with the brackets, F' F', of the tapering spindles, I I', constructed arranged and operating as described.

5th, The combination of the adjusting screw, J, with the swiveling spindles, I I', wedge blocks, K, and pinch screws, k', all constructed and arranged for joint operation as described.

79,382.—FLANGING FORGE AND FURNACE FOR BOILER HEADS. Joseph Nixon, Altoona, Pa.

I claim the tubular and chambered hearth, A, in combination with air chamber, c, and water and air orifices, all constructed and arranged substantially in the manner and for the purpose set forth.

79,383.—SHEEP TABLE, ETC.—Enos Page, Streetsboro, Ohio.

I claim hinging the legs, B and E, to the table or top, A, in the manner as and for the purpose set forth.

79,384. — HORSE HAY FORK. — Samuel Page, McAllisterville, Pa.

I claim the arrangement of the cross bar, J, with the tines, F F and D, the clip, A, and the bar, B, provided with teeth, c c, constructed and used as and for the purpose herein set forth.

79,385 —FEED-WATER HEATER FOR BOILERS.—H. O. Perry, Buffalo, N. Y. Antedated June 16, 1868.

I claim the heater, C, constructed and arranged within the smoke box and chimney, substantially as shown and described.

79,386.—MACHINE FOR MIXING FLOUR, ETC.—J. B. Peterson, Brooklyn, E. D., N. Y.

I claim a mixing machine, consisting of the rotary shaft, B', on which the arms, c, and disk, g, are mounted, the arms working over a perforated stationary plate, f, or its equivalent, and the disk throwing the particles to be mixed off, substantially as described, all working in a case or box, A, in the manner specified.

79,387.—CULTIVATOR.—E. Phiter, Trenton, N. J. Antedated June 16, 1868.

I claim, 1st, The skeleton frame, E G, constructed as described.

2d, The combination, substantially as described, with a tongue pivoted by a king bolt to the axle of a rock shaft, arranged parallel with the axle, to which it is connected by sectors.

3d, The combination substantially as described, with the tongue pivoted to the main axle by a king bolt, of a transversely slotted plate bolted to the skeleton frame, whereby the tongue can turn laterally without moving the frame.

4th, The combination, substantially as described, with a tongue pivoted to the main axle, of the rock shaft or skeleton frame, the treadles, J, and the driver's seat, for the purpose of steering the machine, as set forth.

5th, The combination, substantially as described, of the tongue and driver's seat with the detent lever, C', and slotted plate, e, whereby the driver can release the tongue or hold it rigidly, as required.

6th, The crank arms, G, constructed and arranged for joint operation, as described.

7th, The combination, with the crank arms, of the drag bars and removable sleeve, h h', for the purpose set forth.

8th, The combination, with the crank arms and sleeves, of the adjustable coupling arms, G' for the purpose set forth.

9th, The combination, with the sleeves, h h1, of the looped drag bars, H, and adjusting clamps, I, for the purpose set forth.

10th, The combination, with the skeleton frame, E G, and adjustable drag bars, H, of the adjustable link bars, L, and slotted cross bars, M, on the lifting levers, for the purpose set forth.

11th, The combination, with the tongue, of the whiffletrees, connected directly with the cranks, C, as and for the purposes set forth.

12th, The combination, with a tongue pivoted to the axle by a king bolt, of a skeleton frame carrying plows, adjustable in pairs, with the wheels also adjustable on the axle, substantially as described.

79,388.—PERMUTATION LOCK.—O. E. Pillard (assignor to F. H. North), New Britain, Conn.

I claim, 1st, The incline, n, at the inner end of the spindle, with an irregular surface, in combination with the dog, f, and series of tumblers, e, as and for the purposes set forth.

2d, The ring, n, fitted loosely upon the inner end of the spindle, so that it may be stopped by contact with the dog, f, as and for the purposes set forth.

3d, The disk, x, with an irregular periphery, in combination with the spindle c, and incline, n, substantially as and for the purposes specified.

79,389.—HORSESHOE.—Z. V. Purdy, Washington, D. C.

I claim, 1st, Beveling the inner side of the calks, B B, and the upper side of the heel of the shoe, A, as and for the purposes herein set forth.

2d, Placing the calks, B B, upon the shoe at a point beneath the forward portion of the quarter of the foot for relieving and protecting the same, substantially as herein specified.

79,390.—COAL STOVE.—A. C. Rand, New York city.

I claim, 1st, in stoves, grates, or furnaces, the cone, A, when used alone, or in combination with the air passages, D D, or an equivalent device or means of retaining, supplying, or mixing air with the inflammable gases before final combustion of the fuel takes place in such stoves, grates, or furnaces, substantially as herein described and for the purposes herein set forth.

2d, In combination with the cone, A, and passages, D D, the slide or slides, B and E, for regulating the admission of air, the decomposition of the fuel, and consequent production of gas according to the amount of heat required, substantially as herein described.

79,391.—FIREPLACE GRATE.—Charles S. Rankin, Cincinnati, Ohio.

I claim, 1st. A grate, constructed with two series of front bars, one arranged alternately with and in the rear of the other, substantially as described.

2d, The hinged and perforated summer front and blower, substantially as set forth.

79,392.—STOVE DOOR.—Wm. Resor, Cincinnati, Ohio.

I claim a stove door having an enameled iron knob or handle, for the purpose set forth.

79,393.—SEWING MACHINE FOR BUTTONHOLES.—H. E. Reynolds, Bristol, R. I.

I claim, 1st, The adjustable frame, L, carrying the reciprocating needle bars combination with the lever, P, and cam upon the shaft, A, substantially as described for the purpose specified.

2d, The combination of the lower needle bar with the right angled spring arm, a, and cam, C, substantially as described for the purpose specified.

3d, The combination of the lower needle bar, arm, a, pinion, b, rack, D, spring arm, E, and cam, F, substantially as described for the purpose specified.

4th, The combination of the cam, G, rod, H, arm, J, upper needle bar, having the curved slot, and pin, o', substantially as described for the purpose specified.

5th, The cam wheel, S, and hook, t', in combination with the spring slide, v, spring hook, t, and upper and lower rotating needles, substantially as described for the purpose specified.

6th, The slide, v, adapted to raise and hold the thread in a buttonhole sewing machine during the formation of the stitch, substantially as described for the purpose specified.

7th, The method, herein described, of threading the needle by means of the spring hook and the movement of the cloth.

79,394.—DEVICE FOR SECURING EYEGLASSES.—A. W. Roberts, Hartford, Conn.

I claim the combination of the case and pin, B B', spring and ratchet reel, L F, pawl and tape, M H, or their mechanical equivalents, for fastening eyeglasses to a garment, substantially as described.

79,395.—VENTILATOR.—E. L. Roberts, New York city.

I claim, 1st, In combination with means for effecting a distributed exhaust, as above described, means for effecting a forced exhaust, substantially as and for the purpose described.

2d, Mixed heated air, for heating rooms, with the inflowing distributed supply of fresh air, at or near the top of the room, by means substantially as and for the purpose described.

3d, The combination, with the supply passages, F or F', at or near the top of the room, of the vertical tube, D, substantially as and for the purpose described.

4th, The combination, with the tube, D, of the tube, E, substantially as and for the purpose described.

5th, The combination, with the supply passages through the ceiling, or near the same, and the vertical supply tube, D, of the exhaust passages through the floor, substantially as and for the purpose described.

6th, The combination, with a floor arranged as described, for effecting a distributed exhaust, of the flue, H, provided with a heater, substantially as and for the purpose specified.

79,396.—VALVE GEAR.—E. T. Robinson, Nashua, N. H.

I claim connecting both the valve rod, a, and the lifting rod, d, to the sliding block, c, and the arrangement of the rock shaft, D, arm, j, and eccentric k, for giving an equalized motion to the link C, when said parts are combined with the tumble shaft, G, rod, F, and lever, E, substantially as and for the purposes herein set forth.

79,397.—LOCK NUT.—J. Rogers, Sterling, assignor to himself and F. W. Pratt, Chicago, Ill.

I claim a self-locking nut, constructed and operating substantially in the manner and for the purposes specified.

79,398.—HAND COAL SIFTER.—G. H. Ruth, Boston, Mass.

I claim the arrangement and combination of the hand loop, B, the guard, C, and the scoop, A, made and provided with teeth, the whole being substantially as and for the purpose described.

79,399.—SCAFFOLD AND LADDER.—Robert Rowan, Parnassus, Pa.

I claim the bar, A, and the traversing frame, D, in combination with a ladder or scaffold, when arranged and operated substantially as and for the purposes herein shown and described.

79,400.—REAMER FOR WELLS.—A. J. Salisbury (assignor to himself and T. R. Bard), San Buena Ventura, Cal.

I claim the combination of the branches, A, cross bar, B, toggle bars, D, shank, C, and spring, S, substantially as and for the purpose set forth.

79,401.—ROCKING SWING.—Thomas H. B. Sanders, Philadelphia, Pa.

I claim the arrangement of the uprights, z and z', their stays, T and T' and X and X', movable seats, S and S', their swinging backs, S B and S' B' rope, w, with a rocker, A A', of any size or shape, the whole constructed and operated in the manner and for the purpose above set forth and described.

79,402.—MACHINE FOR CUTTING SOAP.—Horace Sargent, Chelsea, Mass.

I claim the combination, with a box-supporting frame, of a cutter carriage, provided with a series of parallel cutting blades, to operate substantially as described.

Also, combining with the blades, i, the plates, g h, for supporting the blades and cutting the soap at the side surfaces of the box, substantially as described.

Also, in combination with the blades, i, the stationary strippers, n, substantially as set forth.

Also, cutting soap in boxes by sliding a cutter carriage successively into the box, the box being changed in position relatively to the carriage after the first operation of the cutters, the operation first cutting the soap into slabs and from two sides of the box and then subdividing the slabs and cutting the soap from the adjacent sides of the box, substantially as described.

79,403.—COMPENSATING FLY WHEEL.—A. H. Smith, Charlton, N. Y.

I claim, 1st, the compensating weight, P, arranged to make two revolutions to every revolution of the crank, F, substantially as and for the purpose set forth.

2d, The pivoted or swinging arm, L, in combination with the compensating weight, P, for reversing it from side to side.

3d, Providing the compensating weight, P, with radial adjustment, to vary its effect as required, substantially as herein described.

79,404.—VAPOR BURNER.—Willard H. Smith, New York city.

I claim, 1st, In burners for light oil, the receptacle, C, connected with the feed pipe and burner, substantially as and for the purposes set forth.

2d, Providing the air tube, E, between the air passages, F F, and the base of the flame, with heaters consisting of the passages, x x, on a heat conducting flange or flanges, K K, substantially as and for the purpose herein stated.

79,405.—BALANCING POLISHING WHEELS.—A. W. Stephenson, Kensington, Conn.

I claim the adjustable balance plate, i, or its mechanical equivalent, in combination with the cap, h, and flange hub, b, and nut, d, constructed and operating substantially as and for the purpose described.

79,406 —HORSE HAY FORK.—W. W. Stevens and John Patchen, Jr., Fontogany, Ohio.

We claim the combination and arrangement of the stem, A rod, B, tines, C, spring, D, bell crank, E, and cord, F, substantially as and for the purpose set forth.

79,407.—BUNG FOR CASK.—A. A. Stimson, Boston, Mass.

I claim the bung, A, constructed with tube, D, cup, C, reservoir, B, for holding water, all constructed to operate substantially in the manner described and for the purposes set forth.

79,408.—BALL AND SOCKET JOINT.—M. W. St. John, Leonardsville, N. Y. Antedated June 18, 1868.

I claim the combination of the socket, a, ball, E, concave plate, b, rubber, d, and cap, F, when connected to the parts substantially in the manner and for the purposes specified.

79,409.—CHURN.—S. S. Stokes, Westboro, Ohio.

I claim, 1st, The outer dasher, consisting of blades, N N, annulus, n, and shafts, M, connected at the bottom to the central shaft, J, in combination with the inner dasher, consisting of blades, P P, mounted upon arms, O O, deriving rotation from the hollow shaft, L, and sleeve, I, all substantially as herein described.

2d, In combination with the described elements of the preceding clause, the detachable tripod frame, C C' D, c c' d, and screw, E, for the object explained.

3d, The triangular construction of the dashers, N and P, when said dashers are applied and employed substantially as and for the purposes specified.

79,410.—CARS, WAGONS, AND OTHER VEHICLES.—T. Stone, (assignor to himself and Virgil H. Lyon), Plainfield, Ind.

I claim, 1st, A wagon box, A, having the pivoted leaves, a a a, etc., in combination with the rods, e e, and rod, b, cleats, p p p, and lever devices, for operating the said rods and leaves, all substantially as shown and described and for the purpose set forth.

2d, The levers, j e e rods, e e, links, k k, substantially as shown and described, in combination with the leaves, a a a, and box, A, all substantially as and for the purpose shown and described.

3d, The levers, j j, in combination with rod, b, leaves, a a a, and box, A, substantially as and for the purpose shown and described.

79,411.—SALVE.—Coe Swartout, Joliet, Ill.

I claim, 1st, The use of the ingredients, in the proportions and manner described, as and for the uses and purposes set forth.

2d, The said salve, as a new article of manufacture.

79,412.—MACHINE FOR DRYING TUBULAR FABRICS.—O. C. Sweet, Albany, N. Y. Antedated June 19, 1868.

I claim, 1st, The heating devices, consisting of the chambers, c d, and spiral chamber, e, passage, p, and tube, F, in combination with the brushing and pressing apparatus, substantially as herein shown and described.

2d, The spreader, G, when consisting of the parts, s t u v and w, all made and operating substantially as herein shown and described.

3d, The vertical tube, F, and adjustable cap, l, as described, in combination with the spreader, G, made as set forth.

4th, The arrangement of the revolving platform, B, hinged arms, C, annular cloth support, S, and tube, F, as herein described for the purpose specified.

5th, The heating cylinders, D and E, constructed and arranged as described, the spiral chambers, e, cloth support, S, tube F, spreader, G, heating and ironing rollers, g and r, and brushes, L, all made and operating substantially as and for the purpose herein shown and described.

79,413.—HOP PRESS.—Henry Taylor, Middletown, Wis.

I claim the press, consisting of the posts, B B', bed plate, A, upper cross beam, A', screws, F, follower, G, keys, l, side rails, C, and side planking, b, all constructed and arranged to operate substantially as herein shown and described for the purpose specified.

79,414.—BAG TIE.—Edward Truslow, New York city.

I claim the lock or bale tie formed by bending the corners of the plate A, over, as shown at a a1 a2 a3, substantially as and for the purpose set forth.

79,415.—BRACKET FOR SHINGLE ROOF—Peter B. Turner, Quincy, Mass.

I claim, 1st, The block, E, constructed as described, in combination with the adjustable bar, A, as set forth.

2d, The combination of the block, E, adjustable bar, A, bar, B, standards, C C', and movable bar, D, substantially as and for the purpose set forth.

79,416.—MACHINE FOR ROLLING TIRES.—T. E. Vickers, Sheffield, England.

I claim so arranging a rolling mill that the parts of the rolls between which the work is performed shall overhang their bearing, and the remaining parts of the rolls be extended in opposite directions, as described, when the rolls are provided with flanges, the whole constructed to operate as and for the purposes set forth.

79,417.—MACHINE FOR MAKING HORSESHOE NAILS.—G. D. Walcott, Jackson, Mich.

I claim, 1st, The combination of the tongs, P, and supplemental gripers, r t, with the furnace, all constructed and arranged substantially as shown and described.

2d, The tongs, P, constructed and arranged as shown, when said tongs are placed in such a relation with a heater or furnace, Cx, that they will grasp the nail rod between the fire and the working parts of the machine.

3d, The supplemental gripers or jaws, r t, in combination with the gripers, n n, of the tongs, P, all constructed and arranged substantially as described.

4th, The plate, l, to which the tongs, P, are attached, when said plate is operated in a vertical and longitudinal direction for the purpose of actuating or moving the nail rod during the formation of the nails, in the manner and by means substantially as shown and described.

5th, The cam rim, Q, on wheel, E, roller, p, and spring, q, in combination with plate, l, and the lever, V, spring, a x, arm, W, on shaft, w, and the arm, T, on shaft, B, all arranged as shown for the purpose of operating the plate, as set forth.

6th, The pendent anvil, D, fitted in an overhanging block, C, and the devices for lifting and holding the nail blank thereto, in combination with the adjustable rollers, f, so arranged that the nail rod will be operated upon at the under side of the anvil, as shown and described.

7th, The rollers, f, fitted in adjustable arms, F, applied to the wheel, E, substantially as shown, in combination with the anvil, D, all arranged substantially as and for the purpose specified.

8th, The edgers, G G, fitted in pendent oscillating bars, H, hung on the anvil block, C, combined and arranged to operate in connection with the rollers, f, and anvil, D, substantially as and for the purpose set forth.

9th, The edgers, G G, each provided with two dies, h x h x x, constructed and arranged substantially as shown and described, so that the upper dies, h x, will serve as working dies, and the lower ones, h x x, as bumpers to prevent the upper dies coming in contact.

10th, The cam wheels, K K', in combination with the bell crank lever, rollers, arms, and other devices for giving motion to the edgers, substantially as shown and described.

11th, The two cutters, c x f x, applied respectively to a swinging bar, V', and a vertically sliding bar, W', connected by the bars, X Y, the former of which is on the rock shaft, J, and all arranged so that the two cutters will be operated by a single cam or arm, U, on driving shaft, B, and the finished nail cut off at the spot where it was made, substantially as shown and described.

12th, The combination of the cam, Z, lever, V, and plate, l, arranged and operating substantially as described.

13th, The spreader, S, in combination with the wheel, E, tongs, P, and gripers, n n, all arranged in the manner substantially as and for the purpose specified.

14th, The combination of the wheel, E, provided with the rollers, f, the anvil, D, plate, l, with tongs, P, attached, and the edgers, G, all arranged and operated in the manner substantially as and for the purpose set forth.

15th, The combination of the two cam wheels with varying radii, one the counterpart of the other, with the bell crank lever, the rollers attached thereto, and other devices, or their equivalents, as shown and described.

16th, The cam, Z, lever, A x, and graduated bar, B x, in combination with the lever, V, and the other parts, necessary for adjusting the feed of the nail rod, substantially as herein shown and described.

17th, The lever, R, having jaw, r, the fixed jaw, t, in the bearing, s, and the pin, u, upon the wheel, E, in combination with the grippers, n n, all arranged substantially as described.

18th, The combination of the cutters, c x f x, with the cam wheels, K, K', and edgers, G G, with their intermediate mechanism, whereby the force of the blows of the edgers is increased for the first blow upon the nail, and the time required for such increase of force made available for the operation of the cutters, substantially as herein shown and described.

79,418.—BUTTONHOLE CUTTER.—F. H. Walker, Boston, Mass.

I claim, 1st, A stepped anvil or cutter bed, G, adapted for use in conjunction with a knife, E, for cutting buttonholes, substantially as described.

2d, A reversible stepped anvil or cutting bed, G, combined with retaining pivot pin, c, set screw, h, and cutter, E, substantially as described.

3d, A reversible stepped anvil or cutting bed, G, substantially as and for the purpose described.

79,419.—MUSKETO BAR FOR WINDOWS.—C. T. Warren, Linden, N. J.

I claim, 1st, Rolling and unrolling the musketo netting by the movement of the sash carrying the roller, d, upon the cord, i, substantially as described, for the purpose specified.

2d, The musketo bar or netting, operated as described, by means of the rollers attached to the sashes, the pulleys, g, cords, i, and screws, j, substantially as described, for the purpose specified.

79,420.—PAPER CAP.—Nehemiah Waterman and Alfred T. Perkins, Toledo, Ohio.

We claim as a new article of manufacture, the paper cap or hat herein described, formed of paper or analogous material, with a number of sectors, a a a, secured at the center by a seal, b.

79,421.—BOAT.—Elisha Waters and Geo. A. Waters, Troy, N. Y.

We claim the building of the entire shell or skin, and the decks (where used) of paper, as hereinbefore set forth, and thus forming a new article of manufacture.

79,422.—PLANT PROTECTOR.—Jeremiah M. Watson (assignor to himself and Wm. B. Wickes), Sharon, Mass.

I claim a plant protector in which a screen of gauze, netting, or equivalent woven and pliable fabric, is combined with the hoop or ring, A, and the supporting stake, D, in the manner and for the purposes shown and set forth.

79,423.—MACHINE FOR MAKING CIGARS.—Arnel Weeks, Syracuse, N. Y.

I claim, 1st, The combination in a cigar machine of the three peculiarly formed elastic rollers, C E F, mounted in rigid bearings and driven by a band, with the similarly formed elastic compressing roller, G, mounted in the vertically vibrating frame, H, and rotated by frictional contact merely with the other rollers, whereby I am able to apply both the binders and wrappers to two cigars simultaneously by one continuous operation of the machine, as set forth.

2d, The combination substantially as set forth, with the driving roller, C, of the heading dies, D, arranged at a distance apart greater than the length of the two finished cigars, whereby one end of each cigar may be finished by its respective die.

3d, The combination of the peculiarly shaped rollers, the flanges, f, and the interposed fixed head blocks, J, these parts being arranged as set forth, for joint operation.

79,424.—PAPER RULING MACHINE.—Wm. S. Wilder, New York city.

I claim, 1st, The wheel, N, having the adjustable and removable cam, P, for operating the pivoted feed plate, Z, through the medium of the pivoted lever, V, carrying the friction roll, W, the connecting rod, X, and pivoted lever, V, all constructed and arranged to operate substantially as herein shown and described.

2d, The combination of the wheel, N, having one or more adjustable and removing cams or lifters, O P, attached to it, and projecting from each side, the friction wheel, T, and lever, R, with each other and with the cylinder, B, and pen beam, S, whether said lever, R, is connected with the front or rear edge of the said pen beam, S, substantially as herein shown and described and for the purpose set forth.

3d, The extension belt, D', adapted for the application to it of the lifters, O P, in combination with the adjustable roller, E, and levers, V R, by means of which a sheet may be ruled with lines which are not continuous, substantially as herein shown and described.

79,425.—MACHIME FOR KILN DRYING.—Ashbel B. Winegar, San Francisco, Cal.

I claim, 1st, A machine for drying salt and other substances, composed of the furnace, A, pan or disk, B, the radial arms, G G, spindles, H H, with the hoes or stirrers, I I I, attached to them, with the movable bar, J, for turning them in different directions, so as to continually stir and turn the salt in the pan or discharge it at will from the periphery, the whole constructed and arranged to operate substantially as herein described.

2d, The sliding board or plate, O, at the bottom of the hopper, operated by the spring, P, cords, S, lever, T, and beveled pinion, U, substantially as and for the purpose specified.

79,426.—MATCH SAFE.—H. M. Woodford, Kensington, Conn.

I claim a match safe constructed substantially as shown and described, as an article of manufacture.

79,427.—ELECTRO-PLATING AND PLATED WARE.—Howell W. Wright, Taunton, Mass.

I claim the art of electroplating polish ware at once, without dipping in acids or other dips that affect the polished surface.

Also as my invention, the process of electro-silverplating the previously polished electroplated article, with a protective transparent layer of pure silver, all substantially as and for the purposes set forth.

79,428.—COMBINED MOP AND WRINGER.—John A. Wright, Keene, N. H.

I claim the sliding and revolving handle, A, with the device for locking it in place, and the device for catching the mop cloth, in combination with the jaws, B C, substantially as and for the purpose described.

79,429.—FIFTH WHEEL FOR CARRIAGES.—Eliphalet H. Adams, Detroit, assignor to himself and C. F. Gardner, Pipestown, Mich.

I claim the construction of a circle or "fifth wheel" for land carriages, as above described, with the ring, C, working in Babbit metal or other suitable material, confined in the circular channeled disk, A, when arranged and operating substantially as and for the purposes herein set forth.

79,430.—WAGON JACK.—Francis Arnold, Haddam Neck, Conn.

I claim, 1st, The adjustable collar, B, with hole to fit post, A, and provided with journals, a a, and lugs, b b, arranged substantially as and for the purposes herein set forth.

2d, The movable tongue, C, with corrugations on its upper side, and the rims, d d, on its lower side, substantially as and for the purposes herein set forth.

3d, The combination of the adjustable collar, B, movable tongue, C, and movable lever, D, arranged and operating substantially as and for the purposes herein set forth.

79,431.—LOW WATER ALARM FOR BOILERS.—Jearum Atkins, Washington, D. C.

I claim, 1st, The combination of the following devices in a low water alarm for steam generators, viz., the box, H, passages, I and V, each with a cock, float, k, valve, S, port, R, cylinder, G, piston, F, connected to the lever of the alarm cock, a discharge port from cylinder, G, closed or opened by cock, U, discharge port, L, and detachable cover, or the equivalents of these parts.

2d, The construction of the cock, J, with the ports, I and L, as described in combination with the box, H, substantially as set forth.

3d, The tubular piston rod, T, with the cock, U, substantially as set forth

79,432.—FLUID FOR EXCITING GALVANIC CHAINS.—Frands T. Bakker, Chicago, Ill.

I claim the fluid consisting of herein stated ingredients, mixed in proportions as described, to be used in combination with galvanic chains, in treating diseases by galvanism.

79,433.—COTTON PLANTER.—E. L. Barnett, El Dorado, Ark.

I claim the cotton planter consisting of the main frame, A, standards, D, handles, E, breaking plow, B, furrowing wheel, K, cogged wheel, I, hopper, G, provided with a shield, g, and teeth, b, all arranged, combined, and constructed substantially as described.

79,434.—MACHINE FOR FORMING RINGS ON CARBOYS AND BOTTLES.—Thomas Barrett, Charlestown, Mass.

I claim, 1st, The rolls, of any desired shape, having a simultaneous motion toward a central plug, whether operated by the mechanism herein described or any other substantially the same, for shaping or forming the rings of carboys or bottles.

2d, The expansive plug, C, constructed and operating substantially in the manner and for the purpose herein specified.

79,435.—CURTAIN FIXTURE.—G. F. Beardsley, Ithaca, N. Y.

I claim the construction and arrangement of the described parts, viz., the winding cylinder, F, crank, D, weighted knob, E, and case or frame, B, supporting and holding the same, so as to make a fastening or fixture for the cord or tape of curtains, substantially as set forth.

79,436.—STEAM SAFETY VALVE.—W. H. Bechtel, Philadelphia, Pa.

I claim, 1st, The weighted tube, D, with its two valves, e and h, in combination with the base, A, its chamber, a, hollow cross piece, d, the within described valve seats, f, and the casing, B, the whole being constructed and arranged as and for the purpose herein set forth.

2d, The webs or ribs on the tube, D, adapted to the opening, b, of the casing, B, as and for the purpose herein set forth.

3d, In combination with the tubular valve, D, the spindle, G, rod, I, and the arms, H and K, for the purpose specified.

79,437.—APPARATUS TO PREVENT HORSES CRIBBING.—S. S. Bent, Portchester, N. Y.

I claim the metallic roll for the edges of feeding troughs or mangers, formed substantially as specified, for preventing horses biting or cribbing, set forth.

79,438.—MACHINE FOR FORMING BREAD PANS.—M. L. Best, Canton, assignor to himself and J. F. Hess & Brother, Massillon, Ohio.

I claim, 1st, The plate, A, with cam face, n, and connections, m o, when constructed and used in connection with the plate, C, substantially in the manner and for the purpose herein specified.

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2d, The peculiar arrangement and combination of the principal plate, B, with cam faces, k k, and working lever, L, the plates, A A with cam faces, n, the plate, C, the block, D, and die clamp, E, the several parts being constructed and arranged substantially in the manner and for the purpose herein specified.

3d, The peculiar arrangement and combination of the frame, K, with block, D, and arms, a and c, the die clamp, E, with arms, F and G, and the clamp lever, H, with slot, I, the several parts being arranged in the manner and for the purpose herein specified.

79,439.—POTATO DIGGER.—John W. Blodgett, Three Rivers, Mich.

I claim, 1st, The endless belt, G, constructed as shown and described.

2d, The sieve, M, in combination with the disk, a, shown and described, arm, O, elbow lever, P, standard, S, and connecting rods, R and L, all constructed, arranged, and operating substantially as specified.

79,440.—ELECTRO MAGNETIC BURGLAR AND FIRE ALARM.—Edmund Blunt, Jr., Bay Ridge, N. Y.

I claim, 1st, Combining with the armature, F, the springs, G, substantially as and for the purpose specified.

2d, The circuit breakers, J, formed of one or more strips of metal, secured substantially as described.

3d, Combining with the slab, provided with the openings and screw cups, 6 and 7, the arms, 11, armatures, 10, coils, 8, switch, 12, and buttons, 13 and 14, when the same shall be combined and operated substantially as shown, for the purposes indicated,

4th, Combiniug with the door the spring 2, plate of metal 3, and the regulating screw, 4, cannected and operating substatially as described.

5th, Combining with the drum, 15, the disk, 18, when the same shall be combined, constructed, and operating substantially as described.

6th, In combination with the subject-matter of the third claim, the door and alarm, when the same shall be combined and operate substantially as and for the purpose specified.

7th, In combination with the subject-matter of the third clause of claim, the window and alarm, when the same shall be combined and operate substantially as for the purpose specified.

8th, In combination with the subject-matter of the third clause of claim, the drum, 15, and disk, 18, when the same shall be combined and operate substantially as described.

79,441.—PAPER FILE.—John W. Boughton, New York city.

I claim a paper file, consisting of one or more pieces of pasteboard or other suitable material, having notches or recesses cut in its edge, for the reception of ordinary elastic bands, with the bands applied thereto, all substantially as described,

79,442.—SPIKE MACHINE.—James Dryson and Alonzo Potter, New Castle, Pa.

We claim, 1st, The sliding plate, K, when provided with the arms, m and n, or their equivalents, in combination with cutter, F, and guide, O, all arranged and operating in the manner and for the purpose set forth,

2d, A slide or sliding arm, n, arranged on the bed of the machine, as described, in combination with its operative mechanism, for the purpose of moving the rod to position, substantially as described.

79,443.—BELT SHIPPER.—Erastus Buck, Vincennes, Ind.

I claim the combination of the shipper, H, pivoted lever, G, and pulleys, D' E, when arranged and operating substantially as described.

79,444.—INKSTAND.—C. Thurston Chase, Albany, N. Y.

I claim in combination with an ink well, having a rim, D, and catch d, the pivoted cover E, when constructed, attached, and operated substantially in the manner and for the purposes specified.

79,445.—DUMP CAR.—William Chisholm, Cleveland, Ohio.

I claim, 1st, The construction and arrangement of a section of a railroad track by means of trunnions or bearings to support the track, and thereby allow a longitudinal and transverse tilting and vibrating of the same, substantially as and for the purpose set forth.

2d, The segments, J K, in combination with the section of a track, A, and trunnions or bearings, as described.

3d, The combination of the sectional tilting track, A, with the turn table, L for the purposes set forth.

4th, The combination of the sectional tilting track, A, turn table, L, with a transfer table, M, in the manner as and for the purpose described.

79,446.—FISH HOOK.—John B. Christian, Mount Carroll, Ill.

I claim the revolving grooved plate, B, the artificial worm, A, the hooks, c c c, and the wire, D, as arranged in relation to each other, substantially as herein described.

79,447.—TUCKING DEVICE FOR SEWING MACHINE.—William H. Cole, Quincy, Mich.

I claim the combination, with foot, A, of plates, C, E and G, the latter provided with stop, F, slotted arm, B, screw, 2, indicator, D, and strew, H, all constructed, arranged, and operating as herein described and shown.

79,448.—DREDGING MACHINE.—D. C. Cregier, Chicago, Ill.

I claim, 1st, The guides, d and screws, f, with the shaft, k, and bevel-pinion, k and their connections, in combination with the vertical framework, E, and its connections, adapted to transmit the power at any elevation, as and for the purposes herein set forth,

2d, The inclined framework, E', mounted on the upright frame, E, as represented, and adapted to be adjusted in the several directions, and operating the dredging mechanism, H h, in an inclined position, while the rising and lowering motion may be vertical, as and for the purposes herein specified.

3d, The guides, m, formed and arranged as represented on the revolving parts, G1 G2, and adapted to guide the pitch chains, H, and consequently to control very exactly the working paths of the buckets, h, or their equivalents, as and for the purposes herein specified.

79,449.—RAILROAD CAR HEATING AND VENTILATING APPARATUS.—Samuel Darling, Bangor, Me.

I claim, in combination with an endless pipe for conveying a heated fluid, a blower, operated substantially as described, to cause a continuous circulation of the fluid in the pipe,

Also, the combination, in a stove or furnace, and beneath the fire chamber, of a water vessel, and an intermediate non-conducting chamber, having a ball valve, or its equivalent, substantially as and for the purpose described.

Also, the combination, with the smoke pipe, of a conical chamber and a ball valve, or its equivalent, substantially as and for the purpose described.

79,450.—CULTIVATOR.—John H. Davey, Rockford, Ill.

I claim the frames, B and C, the standards, D D, pins, E, the chains, F F, the lever, K, the chain K', all constructed, combined, and operating substantially in the manner and for the purposes set forth,

79,451.—CULTIVATOR TOOTH.—Daniel Dean, Brighton, Mich.

I claim the reversible cultivator tooth, A, when constructed substantially as shown and for the purposes described.

79,452.—HARVESTER.—Charles Denton, Decatur, Ill., assignor to "Ames Plow Company," Boston, Mass.

I claim, 1st, Fulcruming the lever which actuates the sickle bar, at or near its centre, by means of a moveable lever, and driving it by a link, connected at the rear of the frame with the driving mechanism, which is located outside of the frame.

2d, Pivoting the sickle bar lever to a laterally moveable or vibrating lever, substantially as and for the purpose set forth.

3d, The combination of the floored offset, k1, and its side board, l1, with the auxiliary belt and the main belt of the spout.

4th, Combining with the conveyer rolls, a1, the clearers, s1, substantially as set forth.

5th, Combining with the reel, i, the truss wires attached to a central ring, and to disks or hubs at the opposite ends of the axle, substantially as set forth.

6th, Combining with the frame or carriage lever, k2, and with the post, l2, the box, m2, with its spring bolt, o2, springing into the holes, n2, of the post, b2, and withdrawn therefrom, substantially as described.

79,453.—FURNACE AND CONDENSER FOR REDUCING QUICKSILVER AND OTHER ORES.—Thomas W. Dresser, San Jose, Cal.

I claim, 1st, The vapor tight hopper, J, and siphons, U U, in combination with this or other smelting furnaces, substantially as described.

2d, The division plate, H H, and the endless carriage, F, constructed and arranged to operate substantially as and for the purpose described.

3d, In combination with a vapor tight furnace, A, provided with a hopper, J, either of the pumps, Q R S, substantially as and for the purpose specified.

79,454.—BEE HIVE.—William J. Elvin, North Madison, Ind.

I claim the bee hive herein described, when its several parts are constructed, combined, and arranged as set forth.

79,455.—FRUIT PICKER.—Ralph Evans, Brant, N. Y.

I claim the metallic casting B, having a flange on its under side, and slotted so as to form a knife, and provided with an angular stem, as and for the purposes set forth.

79,456.—FIELD ROLLER.—A. L. Chubb, Grand Rapids, Mich.

I claim the yokes, B B, cast with projections for sustaining the weight box or driver's seat, in combination with straps, e e, all arranged as herein described.

79,457.—CHIMNEY COWL.—Austin E. Clement, Wapakonetta, Ohio.

I claim hanging the wings, C C', by the bent springs, D D', in the manner and for the purpose set forth, in combination with the cylinder, B, bolts, E E', and pipe, A, substantially as described.

79,458.—FUME CONDUCTOR.—William C. Davis and George H. Knight (assignors to W. C. Davis & Co.), Cincinnati, Ohio.

We claim, 1st, The arrangement of the perforated receiver, E, and notched or perforated ring, D, for the purpose set forth.

2d, The notched ring, D d, or its equivalent, for the use herein designated.

3d, The perforated receiver, E, fig. 3, having the cover, F, as and for the purpose stated.

79,459.—ROW LOCK.—Charles L. Dayton, North Buffalo N. Y.

I claim the combination of the yoke, A, bed plate, C, pivoted eye, D and pin, E, all employed and operating in the manner described, for the purpose specified.

79,460.—MACHINE FOR APPLYING CLOTH PATCHES TO PAPER COLLARS.—C. H. Denison, (assignor to himself, G. W. Ray, and V. N. Taylor), Springfield, Mass.

I claim, 1st, The combination of the plunger or plate, D6, with the bar, F1, attached thereto, the stamps, e, and sponge tubes, d5, all constructed and operating substantially as herein described and for the purposes set forth.

2d, The combination of the plunger or plate, D6, with the bar, F1, attached thereto, the stamps, e, the sponge tubes, d5, and the water pipe, g1, and box, g, when constructed and operating substantially as described and for the purposes specified.

3d, The stamps, e, having the dies, e4, counter dies, x3, and passage, x, therein, all constructed substantially as herein described and specified.

4th, The combination of the stamps, e, having the dies, e4, counterdies, x3, and the passage, x, therein, with the platen, x1, when constructed and operating substantially as described and in the manner set forth.

5th, The combination of the wheel, a1, with the projection, i, thereon, vibrating arm, a2, rock shaft, a3, lever, a6, rod, a8, arm, a9, ratchet wheel and pawl c3, 16, rolls, h8 h9, for the purpose of moving the strips under the dies, e4, substantially as described.

6th, The bar, F3, having the slot, F4, therein, in combination with the stamps e, having the projection, e6, thereon, all constructed and arranged substantially as herein described and set forth.

7th, The sponge tubes, d5, in combination with the water pipe, g1, having outlets, g3, therein, all constructed and operating substantially as herein described, and in the manner specified.

8th, The combination of the sponge tubes, d5, adjustable rod, o8, and valve and valve arm, m4, when constructed substantially as described and operating in the manner set forth.

9th, the sponge tubes, d5, having the side pans, d7, thereon, and the adjusting projection, o5, and its nut, o6, all constructed and operating substantially as described and in the manner set forth.

10th, Applying cloth patches to paper, or paper collars, as herein described, that is to say, by first dampening the paper or collar at the places where the patches are to be applied, and then pressing said patches thereon by means of a punch or die, which, in its descent, cuts the patch from cloth which has been previously made adhesive upon one side by a suitable preparation, and then dried, said cloth being fed or moved automatically to or under the dies, all substantially as described.

79,461.—MACHINE FOR MAKING RASPS.—Major H. Fisher, Bridgeport, Conn.

I claim, 1st, Attaching the cutter, D, to the holder, B, by means of the stirrup, E, and spring, f, when the said stirrup is arranged to hold the cutter, and at the same time allow the point to turn up, substantially in the manner and for the purpose set forth.

2d, In combination with the holder, B, arranged and operated as above, the blank holder, G, and mechanism, substantially as described, for imparting to the said holder a movement relatively to the movement of the cutter across the blank, so that the teeth cut in each row shall be at right angles to the edge of the rasp substantially as herein set forth.

79,462.—HOE.—J. L. Fountain, New Milford, Ill.

I claim, 1st, Forming the curved shank, B, on its inner side or curve, V-shaped or sharp edged, as and for the purpose set forth.

2d, The forward projecting curved shank, B, having an acute angle on its inner side, C, in combination with the blade, substantially as and for the purpose specified.

69,463.—THREE HORSE CLEVIS.—Jos. Fowler, Allegan, Mich.

I claim, 1st, The bars, D, and friction wheel, F, or its equivalent, in connection with any suitable clevis, A, when attached and operating substantially as and for the purposes specified.

2d. The bar or lever, E, when attached to the upper end of the clevis, A, and provided with any suitable device, G, to which to attach a team, when constructed and operating substantially as and for the purposes set forth.

3d, The combination and arrangement of the clevis, A, the bars, D D, the lever, E, the friction roller, F, hook, H, and ring, G, or their equivalent, when constructed and operating substantially as and for the purposes herein described.

79,464.—MANUFATURE OF SUGAR.—Horace P. Gale, Washington, Vt.

I claim the peculiar construction of the inside of my arch, arrangement of smoke stacks, the application of flues in my pan, and the combination of dampers and stop cocks, to produce the advantages herein set forth.

79,465.—MEAT CHOPPER.—C. L. Gilpatric, Boston, Mass.

I claim the arrangement of the cutting or chopping knife, K, in the frame, I, and working in the arms H H, by means of wheels, G E and D, and a shaft through a hollow shaft, F, substantially as and for the purposes herein set forth.

79,466.—DOOR KEY.—Francis Green, Troy, Pa.

I claim the guerd, C, in combination with the arm, f, for closing the key hole, constructed and attached to the key, substantially as shown and described, and for the purpose specified.

79,467.—GRAIN THRESHER AND SEPARATOR.—George W. Greer, and Frank F. Landis, Lancaster, Pa.

We claim, 1st, The double chambered fan casing or flues, f1, and f2, made substantially in the manner and for the purpose specified.

2d, The arrangement of the double shoe, s1 s2, in combination with the regualting board, R, made substantially in the manner and for the purpose specified.

3d, In combination with the regulating board, R, and inclined board, r, the appendage of the wire rack, r r, to the same, made substantially in the manner and for the purpose described.

4th, The racking device when constructed with parallel beams, m, and tooth slates or rakes, u, revolving over each other in the manner and for the purpose specified.

79,468.—MACHINE FOR CUTTING AND TRIMING BRISTLES, FELT, FUR, WOOL, ETC., Charles F. Harlow, Boston, Mass., assignor to himself and Dexter S. King.

I claim, 1st, The combination of the stationay toothed knife, g, and movable toothed knife, g, with the guide, S, and slide, R, when constructed to operate as set forth.

2d, The combination of the sliding table, R, guide, S, slide and cutters, g g, with the slotted arm of the beam, D, and table, A, for the purpose of adjusting the cutters, g g, at any desired distance from the jaws or bars, X X, as specified.

3d, The feed shaft, p, adjusted in the slotted bars and held by the spring, q, in combination with the cutters, g g, arranged upon the sliding table, R, to operate substantially as set forth.

4th, the curved or horizotal bars, X X, when made adjustable to the posts, C C, and arranged as and for the purpose specified.

79,469.—COFFEE ROASTER.—Theodore Heerman's, Pleasant Hill, Mo.

I claim the wire cloth or perforated cylinder, E, when arranged eccentrically within the outer cylinder, D, as described and for the purpose set forth.

79,470.—TICKET PUNCH.—Warren Hill, Springfield Mass.

Antedated May 5, 1868.

I claim the construction and arrangement of the spindle, C, projection, e, and spiral spring, f, in combination, with the lever, A, recesses e', and the slotted lever, B, substantially as described.

79,471.—BEE HIVE.—Jas. S. Hooton, New Carlisle, Ind.

I claim, 1st, The device for entrapping the worms, as specified.

2d, Supporting the racks by the metal staples, S, as shown and specified.

3d, Supporting and holding to their places the racks by means of the metal pins, X", as specified.

4th, Supporting the racks solely upon metal bearings, by means of the pins, X, and staples, S, as set forth.

5th, The hive, R, when its several parts are constructed, combined, and arranged as set forth.

6th, Board, B, when constructed as specified.

7th, The combination of the metal strip, I", the screw, Z, the aperture, V, openings, P and T, through the board, B, with the wire cloth, as set forth and for the purposes specified.

79,472.—COMPOUND FOR COVERING ROOFS AND OTHER STRUCTURES.—Carleton B. Hutchins, Ann Arbor, Mich.

I claim the compounding of ingredients, as herein described, to make a composition for roofing, and for various other purposes, as herein described.

79,473.—POTATO DIGGER.—Moses Johnson, Three Rivers, Mich.

I claim a potato digger having wheel, A, grooved wheel, B, roller, D, arms C, shovel, E, arms, F, belt, G, box, H, lever, K, bar, M, spring, O, and pulley, S, constructed, combined, arranged, and operating substantially as set forth.

79,474.—CLOTHES DRYER.—Wm. Johnston, Appleton, Wis.

I claim, 1st, The movable metallic arms, H, folding into each other and oscillating upon a common fulcrum, operating in the manner described and for the purposes set forth.

2d, The combination and arrangement of the bracket, sides, A A, and the frame rod, B C, with the fulcrum rod, F, the metalic movable arms, H, and the bars, E E E E, with the slot, L, and rivet, J, when operating in the manner specified and for the purposes set forth.

79,475.—BALANCING POLISHING WHEELS.—Horace K. Jones, Kensington, Conn.

I claim, 1st, The use, for the purpose of balancing wheels, of two or more weights, swinging upon pivots located between the axis and periphery, and capable of being fixed at any point upon the side of the wheels, within the limit of their motion, by screw or other suitable means.

2d, The combination of the movable weights, B B, with the fixed weights, D, for the purpose specified.

79,476.—HORSE POWER.—Isaac Keller, Randolph, Ohio.

I claim, 1st, The solid metallic box, G, with the hole, g, therein, when used to contain the speeding gear, P J K, of a horse power, substantially in the manner and for the purpose set forth.

2d, The iron, N, with lip, n, when used in combination with the box, G, with its gear, P J K, and the master wheel, A B B, substantially as and for the purpose herein specified.

3d, The peculiar arrangement and combination of the box, G, axles, H and I, with gear wheels, P, J, and K thereon, iron, N, with lip, n, and master wheel, A B, the several parts being arranged in the manner and for the purpose herein specified.

79,477.—WASHING MACHINE.—G. H. Kidney, Cleveland, Ohio.

I claim, 1st, The cups, H, perforated tubes, G, cylinder, C, and boiler, arranged and operating in the manner and for the purpose substantially as described.

2d, The rotary cylinder, C, provided with interior perforated tubes, G, in combination with the cups, substantially as and for the purpose specified.

79,478.—SAW CLAMP.—Wm. N. Kingston, Bowensburg, Ill.

I claim the saw clamp, having clamps, A, jaws, B, scaffold, C, unright bars, D, platform, J, plank, H, and hooks, G, constructed, combined, and arranged substantially as specified.

79,479.—FUME CONDUCTOR.—George H. Knight (assignor to W. C. Davis & Co.), Cincinnati, Ohio.

I claim, 1st, The perforated case or receiver, D E, formed and adapted to operate as set forth.

2d, The receiver, D d E, so enclosing a boiler or cooking vessel as to confine and direct the fumes, and conserve the heat thereof, when said vessel is so elevated above the stop as to permit the escape of said fumes in the stove flue in the manner set forth.

3d, A pot or cooking vessel, having protruberances, c, adapted and employed to rest either upon the plane of the stove top or within suitable indentations, b, therein, at the will of the operator, for the purpose herein designated.

79,480.—INDICATOR FOR STREET RAILWAY CAR.—James Knight, Philadelphia, Pa.

I claim, 1st, The minute hand, G, and its pin, j, turned by clock work, as described, and moved toward or from the dial plate by a cam wheel, H, in combination with loose indicating hands, h, which are turned by the minute hand, and released at certain determined points on the dial plate, all substantially in the manner and for the purpose specified.

2d, The wheel, J, having adjustable blocks, r, and being operated through the medium of the gearing described by a wire, l, connected with the wheel or axle of the street railway car.

3d, The above in combination with the arms, s', t, and u of a spindle, K, and with the arm, w, or a spindle, L, for starting and arresting the motion of the cam wheel, H, as described.

4th, The cam wheel, H, operated by a coiled spring, g, or its equivalent, for imparting a longitudinal sliding motion to the portion, c, of the spindle, F, for the purpose specified.

5th, The manner, substantially as herein described, of securing the indicating hands, h, to the stem, b, so that they may be turned either separately or together upon the said stem.

79,481.—CAR COUPLING.—Ph. Knoblock, Wyandotte, Ks.

I claim a car coupler, having jaws, A and B, slotted frame, K, crossbar, H, with cord attached as described, lever, G, and hook, M, constructed, combined, and arranged substantially as specified.

79,482.—EYLETING MACHINE.—A. Komp, New York city.

I claim, 1st, The friction spring, n, on the guide pin, e, in the punch, D substantially as and for the purpose described,

2d, The self acting dog, h, and cam, k, in combination with the guide pin, e, and punch, D, substantially as and for the purpose set forth.

3d, The yielding rest, J, in combination with the anvil, I, and punch, D substantially as and for the purpose set forth.

69,483.—SHTTLE.—Perley Saflin, Warren, Mass.

I claim the combination with the shuttle of a treading and guide piece or lip, constructed as described and for the purpose set forth.

79,484.—HEAD BLOCK FOR SAW MILL.—Dennis Lane, Montpelier, Vt.

I claim, 1st, The rollers or wheels, C, supporting the head block, and mounted on shafts eccentric to them, by which the wheels are forced upon the carriage or released from bearing thereon, constructed and operated as described.

2d, The scrapers, H, hinged to the head block, for the purpose of clearing the face of the carriage side from saw dust, constructed and operated substantially as described.

3d, The chain connection, E, attached to the upright supports, and operated by means of a friction pulley, G2, upon a bar, 14, through a treadle, M4, by which, as the carriage is gigged back, the supports will be drawn back on the carriage, constructed and operating substantially as described.

79,485.—VAPOR BURNER.—C. B. Loveless, Syracuse, N. Y.

I claim the pipe, a, retort, m, cap, j, jacket, k, gas pipe, c, burner, g, and chimney, h, constructed and arranged substantially in the manner and for the purposes set forth.

79,486.—PLOW.—Hammond Marshall, Atlanta, assignor to himself and T. W. Chandler, Fulton county, Ga.

I claim the shank, A, constructed as described, with a sharp cutting edge, d d, at the top, curved at the bottom, and provided with slotted projections substantially as and for the purposes herein set forth.

2d, The slotted and flanged projections, B B, on the shank, A, in combination with the lugs, 11, and grooves, h h, on the wings, for the purpose of fastening the same together, substantially as and for the purposes herein set forth.

3d, The pin, b, on the point, C, in combination with the hole, c, on the shank, A, for the purpose of fastening the same together, substantially as and for the purposes herein set forth.

79,487.—MEDICINE DROPPER.—Patrick McElroy, Cambridge, Mass.

I claim a tube for dropping medicine, or other liquid, constructed substantially as and for the purpose described.

79,488.—LAMP BURNER.—Rufus S. Merrill (assignor to himself and Wm. Carleton), Boston, Mass.

I claim, 1st, In a burner in which the upper section, consisting of the deflector, air distributing plate, and chimney holder, with its chimney, is removable from the lower section, composed of the base and wick tube, a sleeve united with the air distributing plate, and shaped in the manner herein described, so that while entirely removed from contact with the wick tube, it shall fit the cap of the lower section, and maintain the upper or removable section in position, substantially as and for the purpose specified.

2d, In combination with the parts arranged as claimed in the preceding clause, guides, or their mechanical equivalents, formed upon the cap and the sleeve, as described, so that the upper section of the burner may be readily adjusted upon the lower section, as set forth.

79,489.—WOOD-BENDING MACHINE.—Elisha Metz, Rochester, N. Y., assignor to himself and A. Cram.

I claim the combination of the annular-rolled concave, B, with the inner circle, D, and the feed rollers, R and R', for the purposes herein shown and described.

2d, The arrangement of the follower, G, with the inner and outer circles, B and D, constructed and operating substantially in the manner and for the purposes set forth.

79,490.—SHUTTLE.—James A. Metcalf, Lawrence, Mass.

I claim, 1st, A threading guide or guide wire, constructed and disposed relatively to the walls of the shuttle, so as to guide the thread directly to the slit, substantially as set forth.

2d, The combination of the threading guide, constructed substantially as shown and described, with a shuttle having a slotted eye.

3d, A thread guide, substantially as described, which performs the double duty of guiding the thread to the eye when threading the shuttle, and also of insuring the proper line of draft from the bobbin.

79,491.—CHURN DASHER.—David S. Miller, West Alexandria, Ohio.

I claim the reversible dasher, a b c d, in combination with the deflector board, g, when the parts are constructed, arranged, and operated in the manner and for the purpose described,

79,492.—WEAR PLATE FOR BOOTS AND SHOES.—Simon Minges, Rochester, N. Y.

I claim, 1st, The combination in the wear plate, B, of the rim, a, covering or enclosing the sole, and the shield, x, protecting the upper as herein set forth.

2d, The combination with the wear plate, B, of the curved cross connections b' b', for expanding the rim, and the dove tailed bearing or bearings, b, for shielding the toe, as herein set forth.

70,493.—REVOLVING HOSE NOZZLE.—Hiram B. Morrison, Le Roy, N. Y.

I claim 1st, The arrangement inside the bent nozzle, D, of the spiral wings, F F, adjustable to different positions across the water way, and capable of being fixed in place, and operating to impart a rotary motion to the nozzle by the current passing through, in the manner and for the purpose specified.

2d, The arrangement in connection with the spiral wings, F, of the elbow arms, d l, resting in the turning ring, l, which is tightened in position by nut, n, the whole as herein set forth.

79,494.—CARRIAGE SHACKLE.—F. B. Morse, New Haven, Conn.

I claim, 1st, A shackle constructed with the recesses, a a, in each of the internal angles, so as to receive the block, H, substantially as and for the purpose specified.

2d, The block, H, formed from india rubber, and with projections, d, upon each angle, corresponding to the recesses, a a, in the shackle, substantially as and for the purpose specified.

79,495.—CARRIAGE WHEEL.—James Nevison and Thomas Nevison, Jr., Morgan, Ohio.

We claim, 1st, The return or hook, b, and spring spokes, B, in combination with the key, F, and hub, C, substantially as set forth.

2d, Spring leaves, E, bolted to and in combination with the spring spoke, substantially as set forth.

79,496.—METALLIC HUB.—John Oliphant, Springhill Furnace, Pa.

I claim, 1st, The combination of the disk I, divided into the sectors or caps J J J', the annular groove, L, the projections, M M M2, and the recesses, N N1 N2, as and for the purpose set forth.

2d, The bevels, H H and T T, as and for the purpose set forth.

3d, The combination of the boxes, B B, tube, A, mud bands, C C, and screws D D, substantially as and for the purpose specified.

79,497.—GRAIN SEPARATOR.—E.C. Patterson, Rochester, N.Y.

I claim, 1st, The arms, E, upon pivots, F, operated by eccentric, G, and operating upper and lower sieves, substantially as described.

2d, The wedge, H, on the lower sieve, for the purpose set forth.

79,498.—TICKET PUNCH.—Wm. J. Phelps, Springfield, Mass.

I claim in a ticket punch a die and counter die, consisting of a group or series of projections, o o, and corresponding perforations, o' o', said group or series of projections and perforations being formed into any desired letter, figure, or character, all constructed and operating substantially as described and for the purposes herein specified.

79,499.—PURIFYING WOOD SPIRITS.—Julius Pollock, Morrisania, N. Y.

I claim the process of purifying pyroxylic spirit, substantially as herein described.

79,500.—HARVESTER.—Amos Rank, Salem, Ohio.

I claim, 1st, A vertically adjustable separating rod or cut off, vibrating in a circular horizontal path, substantially as set forth.

2d, A separating rod or cut-off, vibrating horizontally in a curved path, and adjustable horizontally relatively to the finger beam, substantially as set forth.

3d, A separating rod or cut-off, vibrating horizontally, and capable of adjustment at an angle to the finger beam, substantially as set forth.

4th, The combination, substantially as set forth, of a reel with a separating rod, vibrating horizontally over the platform.

5th, The combination, substantially as set forth, of a dropping platform with a separating rod, vibrating horizontally over the platform.

6th, The combination, substantially as set forth, of an overhung reel, a dropping slatted platform, and a horizontally vibrating separating rod.

7th, The combination of a horizontally vibrating separating rod, supported at one end only with a finger beam hinged to the main frame.

8th, The combination in a harvester of a laterally projecting hinged finger beam, a reel, a platform, and a horizontally vibrating cut-off, when the three latter are mounted on the finger beam and shoe only.

9th, The combination of a dropping platform with a horizontally vibrating cut-off, when so arranged that dropping of the platform interposes the cut-off, and the raising of the platform withdraws it.

79,501.—LUBRICATOR.—James Richey, Cincinnati, Ohio. Antedated April 10, 1868.

I claim a lubricator with its oil reservoir, A, cast in one piece with the stem, B, and furnished with windows, C C', all substantially in the manner herein described and for the purposes specified.

79,502.—CLOTHES PIN.—John G. Roth, New York city.

I claim in a clothes line clamp formed of two jointed levers provided with parallel or nearly parallel contiguous bearing planes, the quadrangular, self-retaining, rubber spring block, arranged and operating substantially as and for the purposes set forth.

Also, in a clothes line clamp formed of two jointed levers, A A, the abruptly terminating jaw recesses, a2 a2, arranged and operating substantially in the manner and for the purposes set forth.

79,503.—MECHANICAL MOVEMENT.—James See, Mitchell, Ind.

I claim the apparatus above described, consisting essentially of the shaft, C, wheel, E, shaft, F, wheels, f G, shaft, H, wheels, h I I, cord or chain, J, pulleys, K M, levers, L N, weights, W W', dogs, Q Q', ratchet wheels, O P, and shaft, D, when the several parts are constructed and combined as above described, and for the purpose set forth.

79,504.—METAL FOUNDERS' BLACKING.—John Carrington Sellers, Birkenhead, England.

I claim utilizing the residue or coke left from mineral oils and other like substances, in stills, after the distilling process, by employing it for metal founders' blacking, substantially in the manner hereinbefore described.

79,505.—BASE BURNING STOVE.—S.B. Sexton, Baltimore, Md.

I claim, 1st, The exposed cylindrical coal-magazine, D, sustained upon the jacket, A, by means of an illuminating ring, C, in combination with a fire pot which is enclosed within the jacket, so as to leave a space around it for the

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descent of the products of combustion on their way to the escape flue, substantially as described.

2d, An exposed coal magazine, D, an illuminating ring, C, an annular flue chamber, A', and a hollow base, B, arranged and combined substantially as described,

3d, The combination of a cylindro-conic coal supply magazine, the cylindric portion being exposed, an inclined illumination ring, C, furnished with mica or other transparent windows or doors, and a fire pot, all in the manner and for the purpose described.

4th, An escape pipe leading into the frame, K, from an exposed magazine, D, when this magazine is arranged over a fire pot surrounded by a descending flue and supported upon a hollow base, B, substantially as described.

79,506.—ANIMAL TRAP.—E. B. Smith, Marietta, Ohio.

I claim the box, A A', with platforms, B C, constructed as described, spring catches, D E, flat spring, e', passage, f, and trap door, f', the whole being combined and arranged substantially as described.

79,507.—HARVESTER RAKE.—Edgar M. Smith (assignor to Mitchell, Vance and Company, New York city.

I claim, 1st, In revolving, rising and falling, and rolling rakes, the elongating and shortening of said rakes by sliding them in their bearings, so that they will sweep an irregular shaped platform, substantially as described.

2d, Locking and unlocking and moving of the rakes out and in by devices, substantially as herein described, that are self-acting and require no attention on the part of the operator, substantially as described.

3d, The combination of the trigger, i, and sliding lever, k, for moving the rake out, so that it can roll in its bearings and thus become a rake instead of a beater, at the will of the operator, substantially as described.

79,508.—STOVE POLISH.—Edwin C. Smith, Brandon, Vt.

I claim a stove polish, composed of the ingredients set forth, substantially as described.

79,509.—GUIDE FOR SCREWS.—Norman Smith, Hartford, Conn.

I claim the combination of the tube, A B, and two or more springs, E, for the purpose of a guide for starting screws, substantially as herein specified.

79,510.—COOKING STOVE AND RANGE.—James Spear, Philadelphia, Pa.

I claim, 1st, The application of double doors to a cooking stove or range, above the fire grate, constructed in the manner and for the purpose substantially as herein described.

2d, The application of raised or ornamental knobs on the back plate of a cooking stove, for the purpose substantially as herein described.

79,511.—COMBINATION OF WOOD AND PAPER FOR CABINET PURPOSES.—A. C. Spencer (assignor to himself, E. B. Jones, and William H. French), Bridgeport, Conn.

I claim the herein described process for combining wood and paper for cabinet and other purposes.

79,512.—HORSE HAY FORK.—G. H. Strough, Watertown, N.Y.

I claim, 1st, The tines, G G, constructed substantially as described, arranged to work in a recess, V, constructed as described, within the sheath or case constituting the body of a pointed fork, and attached to the central rod, F, by means of the pivoted links, t t', all substantially as herein described.

2d, The manner of locking the shanks of the tines, G G', between lips, v v, and shoulders, u, substantially as described.

3d, Effecting the retraction of the tines by means of a spring or springs, applied within the pointed portion, D, of the fork, substantially as described

4th, The arrangement of the pivoted spring catch, c, nose, e, tripping latch b, and cross head, E, substantially in the manner and for the purpose described.

79,513.—STRAW CUTTER.—D. Sturgis, Byron, assignor to himself and M. Thatcher, Shiawassee, Mich. Antedated June 27, 1868.

I claim the arrangement of the cylinder, as constructed with the frame, A, box, J, and feed rollers, K and N, connected together and operating as and for the purpose set forth.

79,514.—STEAM BOILER FURNACE.—Frederick Sulter, St. Paul, Minn.

I claim the construction of the inclined and horizontal surfaces of the semicircular hearth, D, with its side air passages, C C, and spark and draft chamber, E, when arranged and combined as herein described and for the purposes set forth.

79,515.—RAILWAY JOINT.—J. H. Swett, Birmingham, Pa.

I claim, in combination with the abutting ends of two railroad rails, the divided jaws, B, and the divided clamp, C C, said clamp being drawn up tight against the jaws, and the jaws against the rails, by a through bolt and nut, for the purpose of strengthening the joint, substantially as described.

79,516.—MACHINE FOR MAKING RIVETS.—James H. Swett, Birmingham, Pa.

I claim, 1st, The combination of the header, die, and rod, c, all arranged and operated substantially as described.

2d, In combination with the header, die, and rod, c, the holder, T, for keeping the blank straight whilst being pushed up to the header, substantially as described.

79,517.—DEVICE FOR VENTILATING MILLSTONES.—Robert Symes, St. Charles, Mo.

I claim the blower, M, cold blast tube, h, fans, e e' e'' e''', tube, D, and condenser, E, all arranged substantially as specified.

79,518.—HARVESTER.—C. R. Tabor and J. O. Tabor, Salem, Ohio.

I claim, 1st, The arrangement of the lever, D', shaft, E', and arm, F'', in combination with the stay, J, and drag plate, I, for the purpose set forth.

2d, The lever, I', check lever, L', and pointed arm, C', all constructed and arranged to operate as and for the purpose specified.

79,519.—HARNESS BUCKLE.—Spencer P. Taylor, Oxford, Ohio. Antedated June 24, 1868.

I claim the buckle, E, constructed with bridge, A, and spur, d, in combination with tongue, C, when said tongue is formed in the manner specified.

79,520.—LADDER.—Carl C. T. Thomas and Frederick A. S. Raymond, Beverly, Mass.

We claim the movable foot, B, constructed and attached to the side of the ladder, substantially as and for the purposes herein set forth.

79,521.—COMPOSITION CLOCK CASE.—Samuel B. H. Vance and E. M. Smith (assignors to Mitchell, Vance & Co.), New York city.

We claim, 1st, A clock frame, made of the composition herein described, made plastic by diluted alum, and colored and moulded into shape or form, as herein described and represented.

2d, In combination with a composition clock case, made in imitation of marble, a metallic ring, embedded or cemented thereto, which ring serves as a seat for the clock gear, and other attachable or removable parts, as described and represented.

79,522.—METALLIC ROOFING.—Ethan P. Vaux, Washington city, D. C.

I claim a corrugated metal roof that will allow of expansion and contraction in all directions, when the same is constructed and arranged substantially as herein described.

79,523.—WATER HEATER FOR STEAM BOILER.—A. H. Walker, Oswego, N. Y

I claim the arrangement of the pipes, C C and C', chambers, h h, partitions, a, annular chamber, b, drum, A, and pipes, E and D, substantially as herein set forth.

79,524.—CLOTHES DRYER.—J. R. Watkins, Maine Prairie, Minn.

I claim, 1st, The plate, A, having the concave rear side, and provided with the cruciform slot, C, screw holes, D D, and the lug, B, substantially as and for the purpose set forth.

2d, In combination with the above, the screw rod, G, nut, H, and lug, F, having the head, m, and shank, n, substantially as described.

79,525.—SASH SUPPORTER.—John N. Watrous, West Meriden, Conn.

I claim the two spring frames, A and B, combined in a single case, provided respectively with springs, A1 and B1, and bolts, A2 and B2, the yoke of each bolt extending back to the follower or armed hub, D which has its bearings in the side projections, C and C', and operating by the rotation of the spindle H, so as to withdraw either of the bolts, substantially in the manner herein set forth.

79,526.—LAMP SHADE.—Gustav Wedekind, Philadelphia, Pa.

I claim a lamp shade clasp, stamped out in a disk form, in one piece, and with radial arms, which are bent into position to hold the shade to itself, and itself to the glass chimney, substantially as herein described and represented.

79,527.—CHECK VALVE.—J. Wilson, Chester, assignor to A. H. Simon, Philadelphia, Pa.

I claim the valve, B, hung to projections, h, in the casing, confined thereto by the screw cap, d, and arranged for introduction into and withdrawal from the said casing, all substantially as and for the purpose herein set forth.

79,528.—REGULATING DEVICE OF MILLSTONES.—S. Benson (assignor to himself, J. Benson, and J. F. Benson), Centralia, Ill.

I claim the combination of the springs, E E, the disk sections, D D', the pinion, C, and the spindle, A, arranged and operating substantially as and for the purpose herein described.

79,529.—CAR STARTER.—I. N. Bevens, Thomaston, assignor to himself, John H. Olcott, and G. G. Griswold, Plymouth, Conn.

I claim the lever, B', so constructed and applied as to act directly upon the ratchet wheel, D, and employed in combination with the lugs, E, sliding draft rod or bar, H, chain, F, pulley, G, and catch, m, arranged and operating in the manner and for the purpose explained.

79,530.—CLAMP FOR WOOD BENDING MACHINES.—J. B. Van Horn, Trenton, N. J.

I claim the clamp, A, having angular flanges, e e, in combination with the wedge, B, when the same is constructed as described, and the whole operated substantially as described and for the purpose specified.

79,531.—CLOTHES SPRINKLER.—J. W. Walters, Tiffin, Ohio.

I claim, as a new article of manufacture, a clothes sprinkler, constructed as described, and consisting of a vessel, A, having a perforated head, and provided with a hollow handle, B, valve, c, stem, E h, and springs, s, all arranged and operating as set forth.

79,532.—ATTACHING HANDLES TO MOLDBOARD OF PLOWS.—Chas. Williams, Jackson, Miss.

I claim the lugs, a a, bolts, d d, nuts, c c, and handle, e, the whole combined, arranged, and operated substantially in the manner herein shown and described and for the purpose set forth.

79,533.—SPOKE AND FELLY CONNECTION.—Geo. Allen, Winchester, Mass., assignor to B. W. Conroy, Port Huron, Mich.

I claim the within-described device, consisting of the tubular socket, A, the transverse concave seat or rest, B, the attaching arms, C C, and the tenon or projection, D, the latter being formed or cast with the metallic connection, and extending entirely through the felly, in order to cause the tire to be supported by the said tenon, D, substantially as and for the purpose set forth.

79,534.—BABY JUMPER AND CRADLE.—George H. Mellen, Chicago, Ill.

I claim, 1st, The cradle, A, provided with the openings in the bottom, a a', made substantially in the manner and form and for the purpose described.

2d, The cradle, A, provided with openings in the bottom, a a', in combination with the adjustable slides, e e', and spring or springs, B, constructed and made in the manner and form and for the purposes described.

3d, The cradle, A, and openings, a a', combined with the slides and adjustable spring or springs, B, and movable platform, C, constructed and made in the manner and form and for the purposes described.

REISSUES.

66,935.—SKATE FASTENER.—Dated July 23, 1867; reissue 3,007.—E. H. Barney and John Berry, Springfield, Mass.

We claim a skate fastener or key, composed of the socket, B, point, f, and button, e, when made of one or more pieces, substantially as described, and for the purposes specified.

74,799.—MODE OF TREATING MINERAL PHOSPHATE FOR THE MANUFACTURE OF FERTILIZERS.—Dated February 25, 1858; reissue 3,008.—John Commins, Charleston, S. C.

I claim uniting, while hot, phosphatic minerals or earths, with a solution of common salt (chloride of sodium), and water, in part or whole, as and for the purpose herein described.

12,382.—BASE BURNING STOVE.—Dated February 13, 1855; reissue 3,009.—Division 1.—James Easterly, Albany, N. Y.

I claim constructing a stove, as herein described, with openings for the admission of air to the burning fuel at some point or points above the grate, including between said points and the grate sufficient fuel for ignition, at any one time, substantially as described.

12,383.—BASE BURNING STOVE.—dated February 13, 1855; reissue 3,010.—Division 2.—James Easterly, Albany, N. Y.

I claim, 1st, A cooking stove, which is provided with a coal supply magazine and a combustion chamber, arranged without the space enclosed by the outer walls of the stove, substantially as described.

2d, The combination of a coal supply magazine, with a cooking stove, when such magazine is wholly outside of the outer walls of the stove, substantially as described.

3d, In a cooking stove having a magazine for supplying the combustion chamber with fuel, inlets for the admission of air to the burning fuel, arranged at some point or points above the grate, substantially as described.

4th, The relative arrangement of the several parts of the stove, whereby the heated products are caused to circulate around the oven, substantially as described.

55,217.—CIGAR MACHINE.—Dated May 29, 1866; reissue 3,011.—George Moebs, Detroit, Mich., assignee by mense assignments of G. Albert Reiniger

I claim, 1st, The table, A, provided with the troughs, M, in connection with the cigar machine, substantially as and for the purpose described.

2d, The spring hooks, j, in combination with the table, A, apron, b, and roller, a, constructed and operating substantially as and for the purpose specified.

74,941.—CHURN.—Dated February 25, 1868; reissue 3,012.—John B. Raynor, Mazo Manie, Wis.

I claim, 1st, The shaft, C, provided with a series of straight arms, H H, when arranged in combination with the box, B, having a series of I I, in the manner and for the purposes set forth.

2d, The angular arms, G, constructed as shown and described, and arranged upon the dasher shaft, to operate substantially as and for the purposes specified.

66,202.—COTTON GIN.—Dated June 25, 1867; reissue 3,013.—Henry Valentine Scattergood, Albany, N. Y.

I claim, 1st, A ginning cylinder, formed with circular ribs or projections containing or supporting the teeth, said ribs or projections being elevated above the other portion of the surface of the ginning cylinder, and thus leaving grooves for the reception of the guards, substantially as specified.

2d, Forming the ginning cylinder of a series of rings, between which rings or segments of rings, containing teeth, are secured, substantially as specified.

3d, In combination with a cylinder carrying circular ranges of needle pointed teeth, the guards, R, for with openings to their upper ends, as and for the purposes specified.

4th, Attaching the delivering or doffing roller upon arms extending from the axis of the perforated condensing roller or cylinder, so that said delivery roller is allowed to rise and accommodate the thickness of the bat, and is kept properly in contact with the condensing cylinder as set forth.

5th, In combination with the condensing roller or rollers formed with smooth perforated surfaces, the screen, V, and brush blower, B, for conveying the cotton to the condenser, as specified.

6th, A condensing roller or rollers formed of smooth perforated surfaces, in combination with a ginning cylinder and a brush blower to pass the cotton fiber from the said cylinder to the said roller or rollers, substantially in the manner for the purpose above described.

9,653.—CORDED ELASTIC FABRIC.—Dated April 5, 1853; extended seven years; reissue —, dated June 18, 1867; reissue 3,014.—Division B.—William Smith, New York, N. Y.

I claim the corded fabric, substantially as hereinbefore described, in which the cords are elastic, and are held between the upper and under weft threads, and separated from each other by the interweaving of the upper and under weft threads with the warp threads in the spaces between the cords, and only there, substantially as above shown.

15,309.—WATER WHEEL.—Dated July 8, 1856; reissue 3,015.—John Tyler West Lebanon, N. H.

I claim the curved bucket head, e, when the said head is combined with the series of segment shape buckets, d d, substantially in the manner herein set forth.

Also, the segment shaped buckets, d d, when the said buckets are formed with and project from the concave surface of the curved bucket head, e, substantially as herein set forth.

Also, the combination of the buckets, d d, with the bucket head, e, when the said buckets are located in positions tangential to the inner guiding circle, c, substantially as herein set forth.

Also, the combination of the scalloped edged rim, f, with the lower edges of the series of buckets, d d, substantially as and for the purpose herein set forth.

Also, the combination of the elevated cover, D, with the curb of my improved water wheel, when the said cover is so proportioned as to receive and sustain the upper bearing box of the shaft of the wheel, substantially as herein set forth.

Also, the combination of the detachable gate box, B, with the mouth of the water way of the water wheel, all substantially in the manner and for the purpose herein set forth.

66,576.—LAMP SHADE.—Dated July 9, 1867; reissue 3,016.—James Emery, Bucksport, Me.

I claim a lamp shade, made of a screen, A, and a carrier, B, designed to be attached, by its upper end, to the chimney of a lamp, with a portion of its body formed to rest against the side of the chimney, which thus serves as a fulcrum on which to support the shade in an inclined position, constructed and applied together, substantially as specified.

31,566.—DRIER.—Dated February 26, 1861; reissue 3,017.—Francis H. Smith, Baltimore, Md.

I claim, 1st, The tunnel, A B C, furnace, R, and chimney, L, when the former is so constructed and arranged that the current of warm air is supplied to the same at the opposite point from which the articles to be dried enter, which causes the articles to be subjected to the action of a varying temperature, substantially as described, and for the purpose specified.

2d, The tunnel, A B C, furnace, R, and chimney, L, and gates, F G H, when the same are so combined and arranged as to operate substantially as described and for the purpose specified.

3d, The tunnel, A B C, furnace, R, chimney, L, and gates, F G H, when the same are in combination with the rails, E E, and car, J, and the whole operates substantially as and for the purpose specified.

20,406.—WATER WHEEL.—Dated June 1, 1858; reissue 3,018.—John Tyler, West Lebanon, N. H.

I claim the hinged section, m, of the inner face of the scroll shaped water way of said wheel, when arranged and operating in conjunction with the movable curb section, k, thereof, substantially in the manner herein set forth,

40,226.—LAMP.—Dated October 13, 1863; reissue 3,019.—Lewis J. Atwood, Waterbury, Conn., assignee, by mesne assignments, of himself.

I claim, 1st, A concave draft plate, having an elongated slot, in combination with a chimney holder, below the edges of that draft plate, and attached to the burner, substantially as set forth, so that the flame will be spread and the light shine both above and below the draft plate.

2d, An opening or series of openings between the said concave draft plate and the interior of the chimney, to allow an auxiliary draft to pass to the flame, in combination with a foraminous air distributor, connected to the burner, substantially as set forth.

3d, A foraminous air distributor, e, formed with or connected to the burner, in combination with a draft plate, supported from the burner and within the chimney, substantially as specified, whereby the action of the air on the flame is regulated by the joint action of said draft plate, air distributor, and chimney.

4th, An air distributor, substantially as specified, in combination with the draft plate and a glass chimney, having a contraction or neck at or near the said draft plate, whereby the said draft plate can be made smaller than with a straight or tapering chimney, and not obstruct the light, substantially as shown.

5th, The chimney holder and the aforesaid draft plate, in combination with mechanism, substantially as specified, for connecting the chimney holder to the burner, whereby the chimney can be removed for trimming or lighting without being detached.

6th, Connecting the said draft plate to the burner by a slide, so that it may be adjusted in position or removed, substantially as and for the purposes set forth.

DESIGNS.

3,072.—SODA WATER FOUNTAIN.—Chas. W. Anderson, Cincinnati, Ohio.

3,073.—LABEL.—Samuel Crump (assignor to E. C. Hazard), New York city.

3,074.—SHOW CASE FRAME.—F. A. Howell, New York city.

3,075.—SCREEN.—Calxin L. Hubbard, New Haven, Conn., assignor to "New Haven Steam Heating Company."

3,076.—COFFEE URN.—George Jones, New Haven, Conn.

3,077.—BOTTLE.—A. Legrand Aine, Fecamp, France.

3,078.—BADGE.—Edward Moore, Portland, Me.

3,079.—COOK'S STOVE.—J. A. Price, Scranton, Pa.

3,080.—DOORS OF A COOK'S STOVE.—Chas. J. Woolson, Cleveland, Ohio.

3,081.—TOY GUN.—Spencer H. Brown and Chas. H. Willets, New York city.

3,082.—SCROLL TO BE APPLIED TO ENVELOPES.—Maro S. Chapman, Hartford, Conn.

3,083.—TRADE MARK.—Spencer M. Clark, Washington, D. C.

3,084.—HANDLE OF SPOON OR FORK.—Augustus Conradt, Philadelphia, Pa.

3,085.—FORK OR SPOON HANDLE.—Augustus Conradt, Philadelphia, Pa.

3,086 and 3,087.—MEDALLION SCARF RING.—Ralph S. Jennings, New York city,

3,088 to 3,093.—FLOOR OIL CLOTH PATTERN.—Charles T. Meyer, Bergen, N. J., assignor to Edward C. Sampson, New York city.

3,094.—CARD BASKET.—Geo. L. Underwood, Boston, Mass.

EXTENSION NOTICES.

John J. Weeks, of Oyster Bay, N. Y., having petitioned for the extension of a patent granted to him the 26th day of September, 1854, which patent was surrendered and application made for reissue in four divisions, for an improvement in harvesters of grain and grass, for seven years from the expiration of said patent, which takes place on the 26th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 7th day of September next.

Joel F. Keeler, of Pittsburg, Pa., having petitioned for the extension of a patent granted to him the 26th day of September, 1854, for an improvement in platform scales, for seven years from the expiration of said patent, which takes place on the 26th day of September, 1868, it is ordered that the said petition be heard at the Patent Office on Monday, the 7th day of September next.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,250.—HEATING AND VENTILATING APPARATUS.—John Johnson, Saco, Me. April 16, 1868.

1,728.—REMOVING INK AND COLORS FROM PAPER, ETC.—Joseph A. Veazie, Boston, Mass. May 26, 1868.

1,732.—ROTARY, STEAM, AND OTHER ENGINES.—J. M. Boorman, Scarborough, N. Y. May 26, 1868.

1,734.—PACKING FOR STEAM ENGINES, ETC.—Ivon B. Miller. Hackney Road, Middlesex, Eng., and Wm. H. Miller, Philadelphia, Pa. May 26, 1868.

1,736.—BREECH-LOADING FIRE-ARMS AND CARTRIDGES.—B. Burton, Brooklyn, N. Y. May 26, 1868.

1,737.—PLOWS AND OTHER IMPLEMENTS FOR CULTIVATING LAND.—S. G Reynolds, Bristol, R. I. May 26, 1868.

1,760.—APPARATUS FOR HOPPING BEER.—Wm. S. Haight, Waterford, N. Y. May 28, 1868.

1,853.—PROJECTILES FOR RIFLED CANNON OR ORDNANCE.—E. A. Dana Brookline, Mass. June 5, 1868.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The largest gold brick ever seen in Montana was lately on exhibition in a bank in Helena. Its weight was 1,682 ounces, and its value $31,050.

The Superintendent of the Pennsylvania railway, investigating the relative cost of making high and moderate grades, has shown that if of two roads, each one hundred miles long, the one has grades of twenty-five feet to a mile, and the other level, and the demand for transportation on each amounts to 2,000,000 of tuns per annum, the difference in favor of the level road is $600,000, or the interest on $10,000,000.

At the steel works of John Brown & Co., at Sheffield, Eng., is a machine for cutting iron rails cold. A circular saw, sixteen inches in diameter and one quarter inch thick, making twenty revolutions per minute, has the power and actually does the work of cutting six steel rails every hour. A feature admirable for the order and cleanliness of the same mill, is a cemetery for the rolls not in use, where they are all buried in special tombs provided for their reception under the iron floor of the mill, whence they are easily removed by the hydraulic cranes.

Professor Hitchcock, of Amherst College, in a recent public lecture, said there was enough copper ore in Gardner's Mountain, New Hampshire, to supply all the United States for two hundred years, the metalliferous vein extending for five miles, and having an average depth of five hundred feet.

The mineral wealth of Algiers is represented to be inexhaustible. At the iron mine Makta-el-Hadeel, near Bône, the mineral in some places crops up above the surface of the ground, and is worked in immense, crater-like cuttings to a depth of one hundred feet. About 200,000 tuns of ore, yielding 65 per cent of pure metal, are annually sent to France from these mines.

The most expensive railway line in England, and probably the costliest ever constructed, is that of the London and Southeastern company's, from Charing Cross to Sevenoaks. Upon this road, less than twenty-six miles in length, the enormous sum of $47,500,000 in gold has been expended. We were informed by an engineer in London that the Charing Cross connection in the city, in length about two and a half miles, cost $5,000 per yard forward, including stations and two bridges across the Thames.

The large alum works in the province of Brandenburg, Prussia, has been purchased by two enterprising New Englanders engaged in business in Hamburg. The number of American firms in that city have doubled since 1866.

Recent investigation has proved the fact that the island of Newfoundland possesses mineral treasures in large variety and abundance. Since the discovery has been made, the project has been revived of building a railway from St. Johns across the country to the western shores of the island. The projectors of the road—among whom is our energetic countryman, Cyrus W. Field—have secured a tract of land twenty miles in width, and extending over the whole length of the contemplated route, the land being wonderfully rich in copper ore of the very best quality. The railroad will open up the entire inland country, and render it accessible for mining operations.

At a recent *conversazione* of the London Institute of Civil Engineers, a curious process for manufacturing steel by friction was explained and commented upon. By the aid of machinery pig iron is ground to powder by a rapidly moving cutter. The great amount of friction generated produces a heat so intense that the iron is set on fire, and after scintillating falls down as reddish-brown dust, the combustion having caused the riddance of the superfluous carbon. The dust is collected, put into a crucible, melted, and when cooled is found to form ingots of steel of superior quality.

In boring a well to obtain water in the town of Dax, Department of Landes France, a bed of rock salt was discovered at the depth of one hundred feet By the use of water, injected through a pipe, the perforation was continued through the rock salt some fifty feet further, and the result is a saline fluid containing nearly ninety-eight per cent of pure salt. A company has been formed to work these remarkable deposits.

NEW PUBLICATIONS.

ENGRAVED PORTRAIT OF GENERAL GRANT.

Many of our readers are doubtless familiar with Marshall's celebrated engraving of Abraham Lincoln, which as a work of art has received the unqualified praise of critics both in Europe and our own country. The same artist has produced, from his own oil painting, a very fine engraving of Gen. Grant, which has received the indorsement of his family. As a superb work of art it equals that of Lincoln, and is worthy of the highest commendation It is published by Tickner & Fields, No. 63 Bleecker street, New York, and is sold by subscription only. We are asked to state that agents are wanted for its sale.

THE MECHANIC'S TOOL BOOK. By W. B. Harrison. D. Van Nostrand, 192 Broadway, New York city.

The author and compiler of this manual very justly says that "no two mechanics work alike," and it needs but little observation to verify its truth. In many shops, particularly the jobbing machine shop, a readiness to adapt with celerity the tools or appliances on hand, or to contrive plans for an exigency, is a rare and valuable quality in workmen, and such men are not easily found. To enable the apprentice to learn and the journeyman to command the use of such appliances is the intention of this volume. As a practical mechanic we think the writer has succeeded in imparting information valuable because given by a practical man, and useful because well arranged and profusely illustrated.

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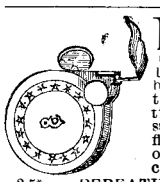

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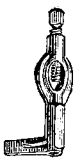

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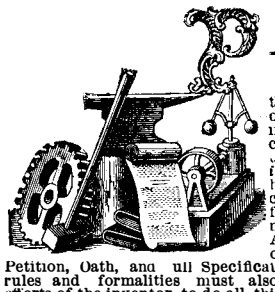

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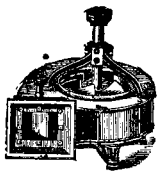

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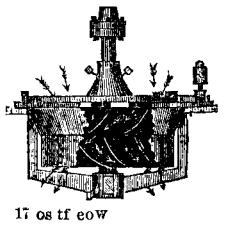

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